

Missouri State Energy Planning (MoSEP)

Missouri Energy Data and Trends



MISSOURI
DEPARTMENT OF
NATURAL RESOURCES
DIVISION OF ENERGY

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Introduction

This document includes recent summary data on energy production, consumption, prices and expenditures in Missouri, as well as comparisons to surrounding states (Arkansas, Illinois, Iowa, Kansas, Kentucky, Oklahoma, Nebraska and Tennessee) and other Midwestern states (i.e., Indiana, Ohio, Michigan, Minnesota and Wisconsin). The Missouri Department of Natural Resources (Department) hopes that these data will be informative as stakeholders identify issues and develop recommendations to meet the state's future energy needs. The department is also working to improve and enhance the reporting of Missouri-related energy data by placing timelier, interactive information on its website. This document is intended to provide an initial overview of Missouri energy data as part of the Missouri State Energy Planning (MoSEP) process.

Section 1 provides an overview of Missouri demographic, economic and total energy data. Section 2 includes details on consumption, prices and expenditures for specific fuels and end-use sectors. Section 3 contains information on energy production. Section 4 provides additional data on energy jobs, rankings and emissions. Data sources for tables and charts are provided in the notes throughout this document.

1. Overview and Total Energy Statistics

Table 1.1 provides an overview of demographic, economic and energy statistics for Missouri.¹ Missouri's population of 6.14 million represents 1.87% of the U.S. total population.² The state's civilian labor force as of June 2020 was 3.0 million, which was 1.89% of the U.S. total.³ Missouri's 2019 gross state product of \$332.1 billion was above the U.S. median (excluding the District of Columbia).⁴ The state's 2019 per capita personal income was 34th in the nation (including the District of Columbia).⁵ Compared to other states, Missouri has a relatively high proportion of land dedicated to agriculture, ranking 12th in the nation in 2017,⁶ and produces relatively little coal, oil, or natural gas.^{7, 8}

When comparing usage and expenditures across states and the District of Columbia, two metrics to consider are the energy intensities of consumption and expenditures. These figures are indicative of energy usage and expenditures in relation to economic activity, and, like consumption and expenditures per capita, also enable normalized comparisons. At approximately 6,490 British thermal units (Btu) per real dollar of gross domestic product (GDP), Missouri ranked 23rd for energy intensity of consumption, with Iowa, Arkansas, Kentucky, Oklahoma, Indiana, Nebraska, Kansas and Tennessee having higher energy intensity figures.⁹ Energy expenditures as a percent of current dollar GDP were 7.40, placing Missouri at 24th in the nation and at a lower percentage than Arkansas, Kentucky, Oklahoma, Indiana, Iowa, Kansas, Tennessee and Nebraska.¹⁰ While the state ranked above the national median for overall consumption and expenditures in 2018,¹¹ total consumption and expenditures per capita were below the national median.¹² Table 1.2 compares energy expenditures in Missouri, the U.S., surrounding states, and Indiana, Michigan, Minnesota, Ohio and Wisconsin.

Table 1.1. Summary Demographic, Economic and Energy Statistics for Missouri¹³

Demography	Missouri	Share of U.S.	Reporting Period
Population	6.14 million (est.)	1.87% (est.)	2019
Civilian Labor Force	3.0 million	1.89%	Jun. 2020
Economy	Missouri	U.S. Rank	Reporting Period
Gross State Product	\$332.1 billion	22	2019
Per Capita Personal Income	\$49,589	34	2019
Land in Farms	27.8 million acres	12	2017
Production	Missouri	Share of U.S.	Reporting Period
Total Energy	245.4 trillion Btu (est.)	0.26% (est.)	2018
Crude Oil	82,000 barrels	0.002%	2019
Natural Gas	596,000 cubic feet	--	2019
Coal	189,000 short tons	0.027%	2019
Electric Power	Missouri	Share of U.S.	Reporting Period
Net Summer Capacity	21,101.3 MW	1.91%	May 2020
Net Generation	76,473 GWh	1.86%	2019
End-Use Consumption and Expenditures	Missouri	U.S. Rank	Reporting Period
Total Consumption	1,848 trillion Btu	20	2018
Total Consumption per Capita	301.8 million Btu	27	2018
Total Expenditures	\$23,587 million	18	2018
Total Expenditures per Capita	\$3,853	31	2018

Sources:

U.S. Census Bureau. 2019. "[QuickFacts: United States; Missouri.](#)"

U.S. Bureau of Labor Statistics. 2020. "[Missouri.](#)" Economy at a Glance.

U.S. Bureau of Labor Statistics. 2020. "[Labor Force Statistics from the Current Population Survey.](#)" Databases, Tables & Calculators by Subject.

U.S. Bureau of Economic Analysis. 2020. "[SAGDP1 Gross Domestic Product \(GDP\) summary, annual by state.](#)" Regional Economic Accounts – GDP and Personal Income.

Federal Reserve Bank of St. Louis. 2020. "[Release Tables: Per Capita Personal Income by State, Annual.](#)" Releases: State Per Capita Personal Income.

U.S. Energy Information Administration. 2020. "[Missouri State Energy Profile.](#)" State Energy Data System.

U.S. Energy Information Administration. 2020. "[Table P2. Primary Energy Production Estimates in Trillion Btu, 2018.](#)" *State Energy Production Estimates: 1960 Through 2018*. State Energy Data System. Page 4.

U.S. Energy Information Administration. 2020. "[Crude Oil Production.](#)" Petroleum & Other Liquids.

Missouri Department of Natural Resources, Missouri Geological Survey, Geological Survey Program. 2020. [2019 Annual Oil Production Figures](#). Page 1.

U.S. Energy Information Administration. 2020. "[Table 2. Coal production by state.](#)" *Quarterly Coal Report*. April 1. Page 3.

U.S. Energy Information Administration. 2020. "[Table 6.2.A. Net Summer Capacity of Utility Scale Units by Technology and by State, May 2020 and 2019 \(Megawatts\).](#)" *Electric Power Monthly*. July 24. Page 146.

U.S. Energy Information Administration. 2020. "[Net generation for all sectors.](#)" Electricity Data Browser.

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U.S. Energy Information Administration. 2020. "[Table E15. Total Energy Price and Expenditure Estimates \(Total, per Capita, and per GDP\), Ranked by State, 2018.](#)" State Energy Data System.

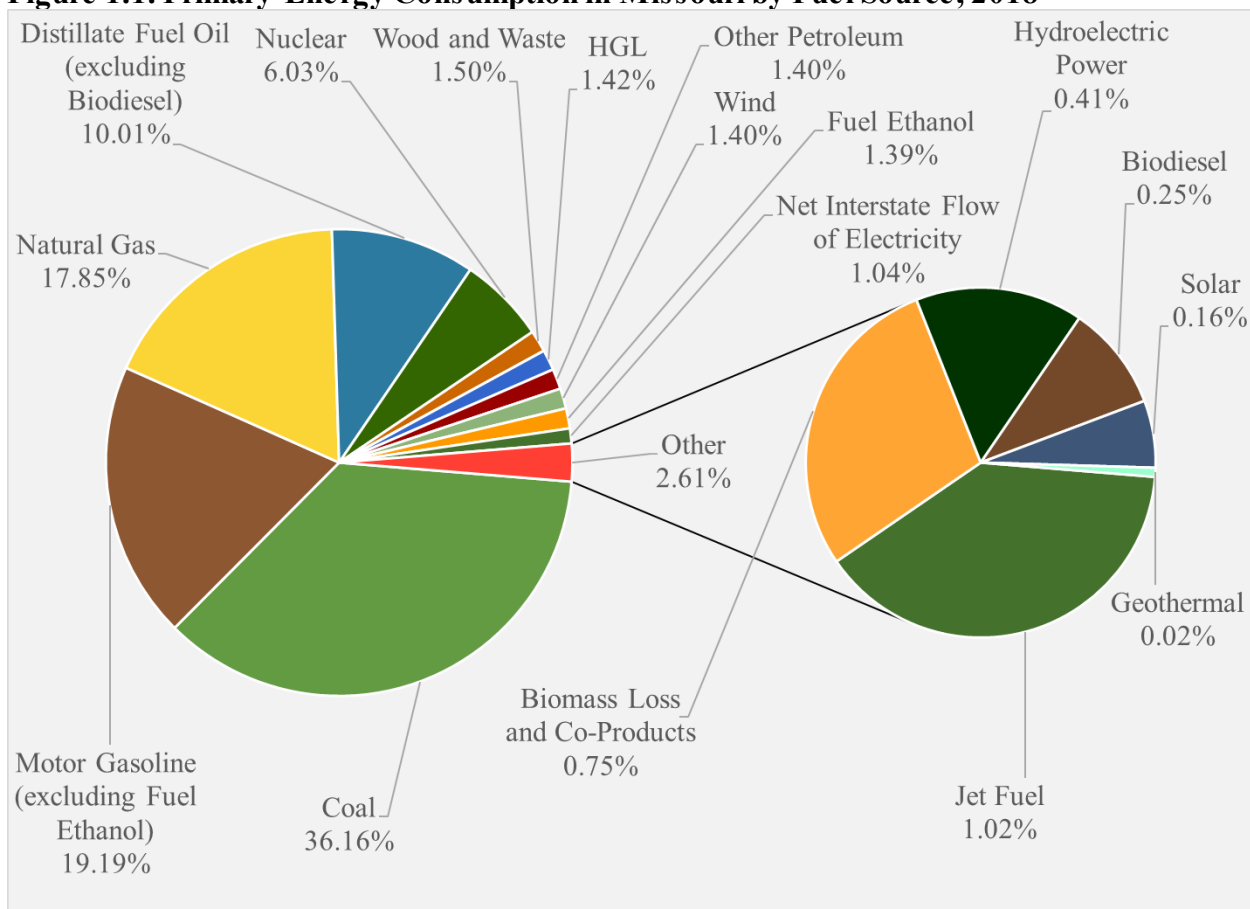
Table 1.2. Energy Expenditures in Missouri, the U.S. and Comparison States, 2018

	Total Energy Expenditures (billions)	Energy Expenditures Per Capita		Energy Expenditures as Percent of Current Dollar Gross Domestic Product	
		Value	Rank	Value	Rank
Missouri	\$23.6	\$3,853	31	7.40	24
Arkansas	\$12.5	\$4,156	21	9.74	9
Illinois	\$44.8	\$3,522	39	5.18	42
Indiana	\$30.0	\$4,486	16	8.19	20
Iowa	\$15.6	\$4,955	6	8.23	19
Kansas	\$12.6	\$4,328	19	7.49	21
Kentucky	\$19.7	\$4,420	17	9.48	11
Michigan	\$36.0	\$3,605	36	6.83	27
Minnesota	\$22.2	\$3,966	24	6.03	36
Nebraska	\$9.2	\$4,785	11	7.43	23
Ohio	\$44.3	\$3,792	32	6.55	30
Oklahoma	\$17.1	\$4,331	18	8.42	16
Tennessee	\$27.1	\$4,001	23	7.44	22
Wisconsin	\$22.7	\$3,909	28	6.75	28
U.S.	\$1,271.1	\$3,891	N/A	6.18	N/A

Source: U.S. Energy Information Administration. 2020. "[Table E15. Total Energy Price and Expenditure Estimates \(Total, per Capita, and per GDP\), Ranked by State, 2018.](#)" State Energy Data System.

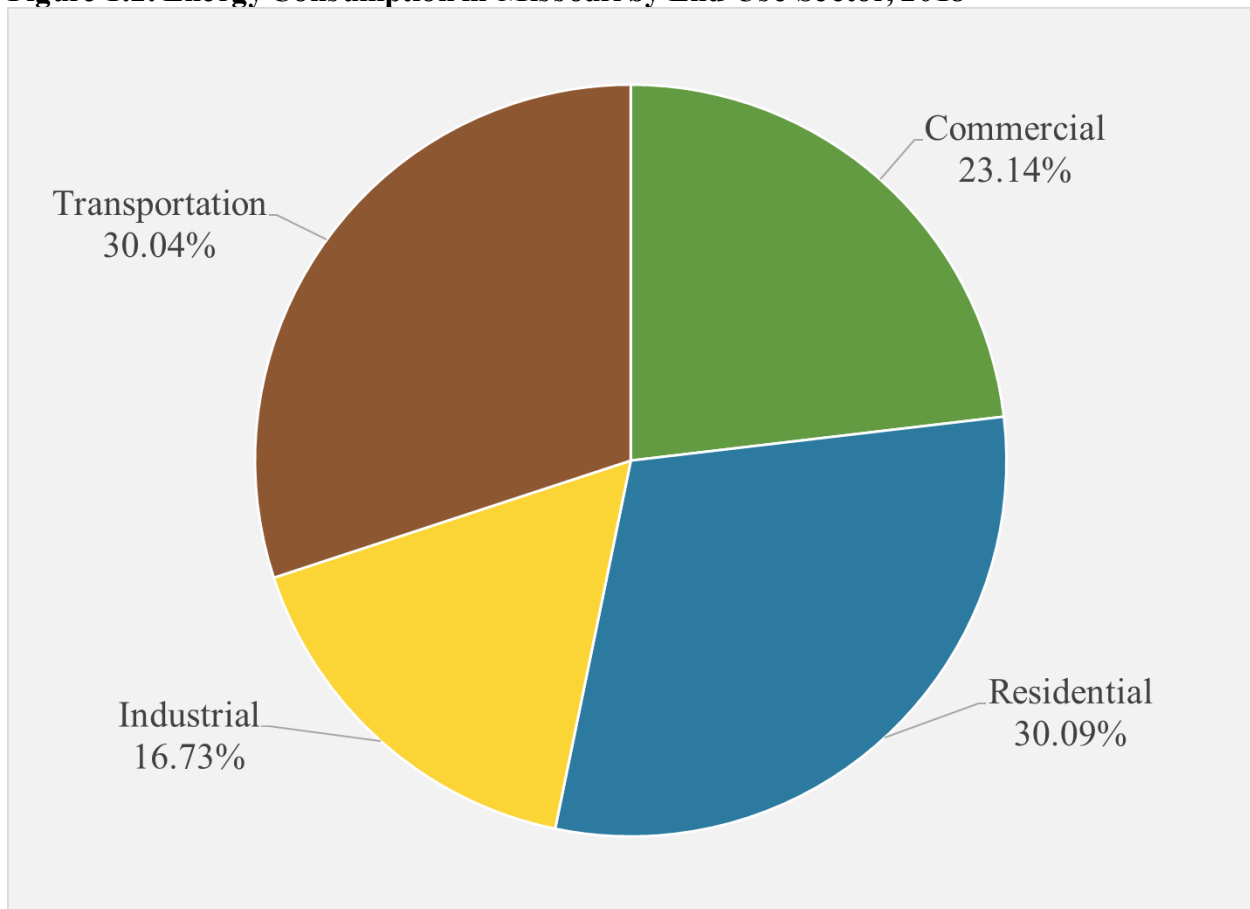
Figure 1.1¹⁴ provides information on energy consumption in Missouri by fuel source in 2018. Coal, motor gasoline (excluding fuel ethanol) and natural gas were the three most-used energy resources.¹⁵ The transportation sector accounted for approximately 30.04% of the energy consumed in Missouri in 2018, while the residential, commercial and industrial sectors accounted for 30.09%, 23.14%, and 16.73% of consumption, respectively, as shown in Figure 1.2.¹⁶ Note that "HGL" stands for "hydrocarbon gas liquids," which includes propane.

Figure 1.1. Primary Energy Consumption in Missouri by Fuel Source, 2018



Source: U.S. Energy Information Administration. 2020. "[Table CT2. Primary Energy Consumption Estimates, Selected Years, 1960-2018, Missouri.](#)" *State Energy Data 2018: Consumption*. State Energy Data System. Pages 288-289.

Figure 1.2. Energy Consumption in Missouri by End-Use Sector, 2018



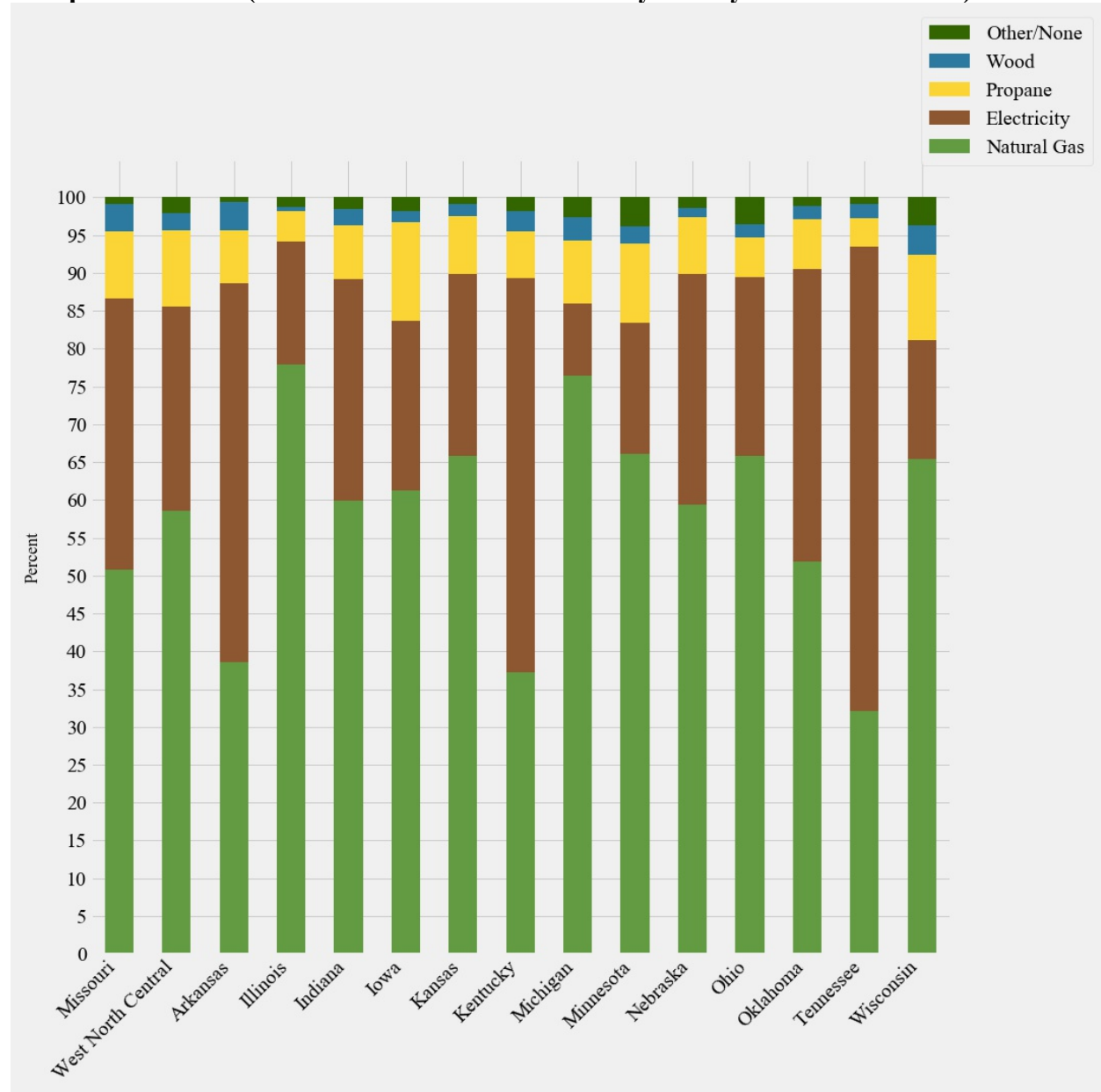
Source: U.S. Energy Information Administration. 2020. "[Table C1. Energy Consumption Overview: Estimates by Energy Source and End-Use Sector, 2018](#)," State Energy Data System.

2. Energy Consumption, Prices and Expenditures

a. End Use Characteristics

Home heating fuel use varies considerably by state. Figure 2.1 shows that while just over half of Missouri homes used natural gas as a heating fuel, the state also had the fifth-largest share of homes heated by electricity in relation to the surrounding states of Indiana, Michigan, Minnesota, Ohio and Wisconsin. A large proportion of homes in Missouri used propane for heating relative to the comparison states.¹⁷

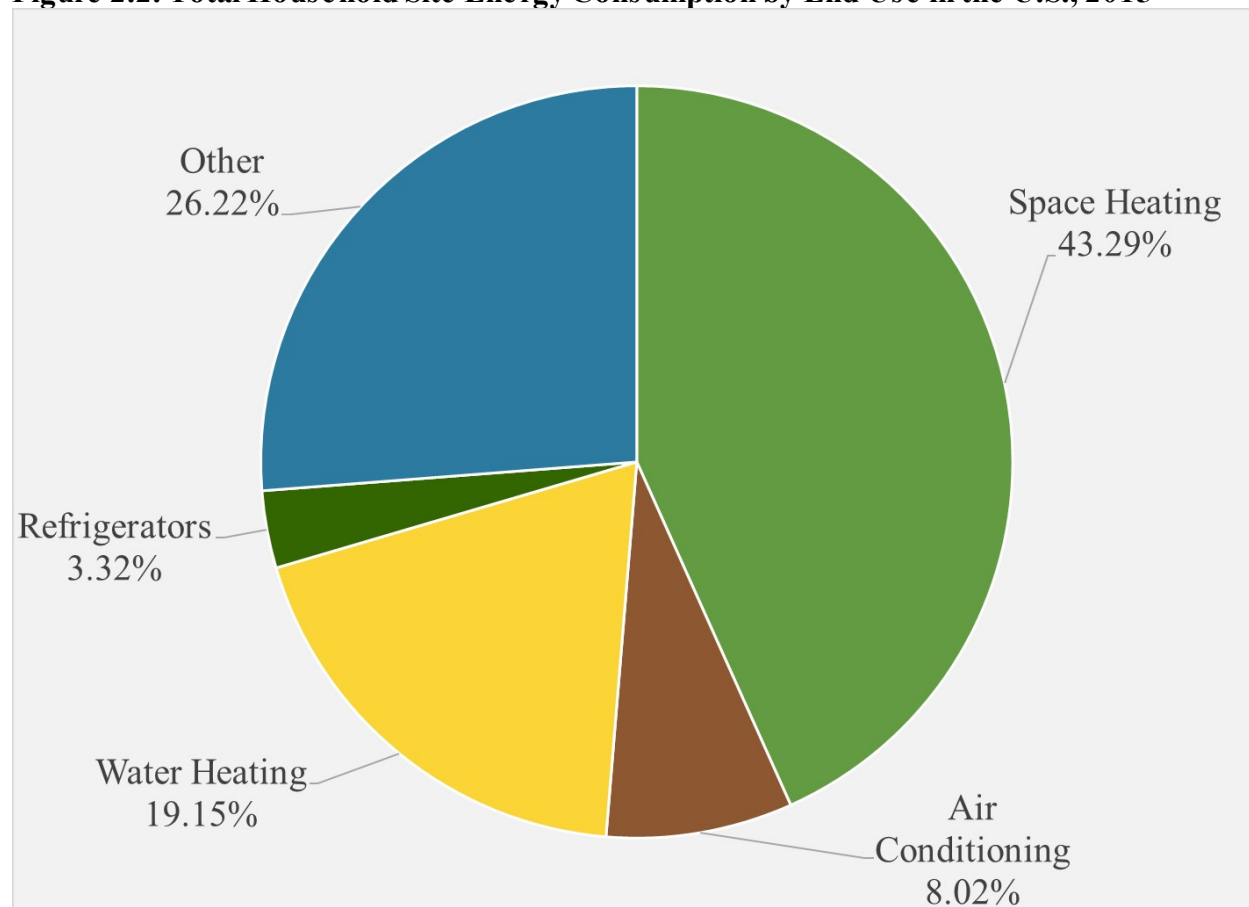
Figure 2.1. Home Heating Fuel Used in Missouri, the West North Central Division and Comparison States (2014-2018 American Community Survey 5-Year Estimates)



Source: U.S. Census Bureau. 2018. "[B25040: House Heating Fuel](#)." 2014-2018 American Community Survey 5-Year Estimates.

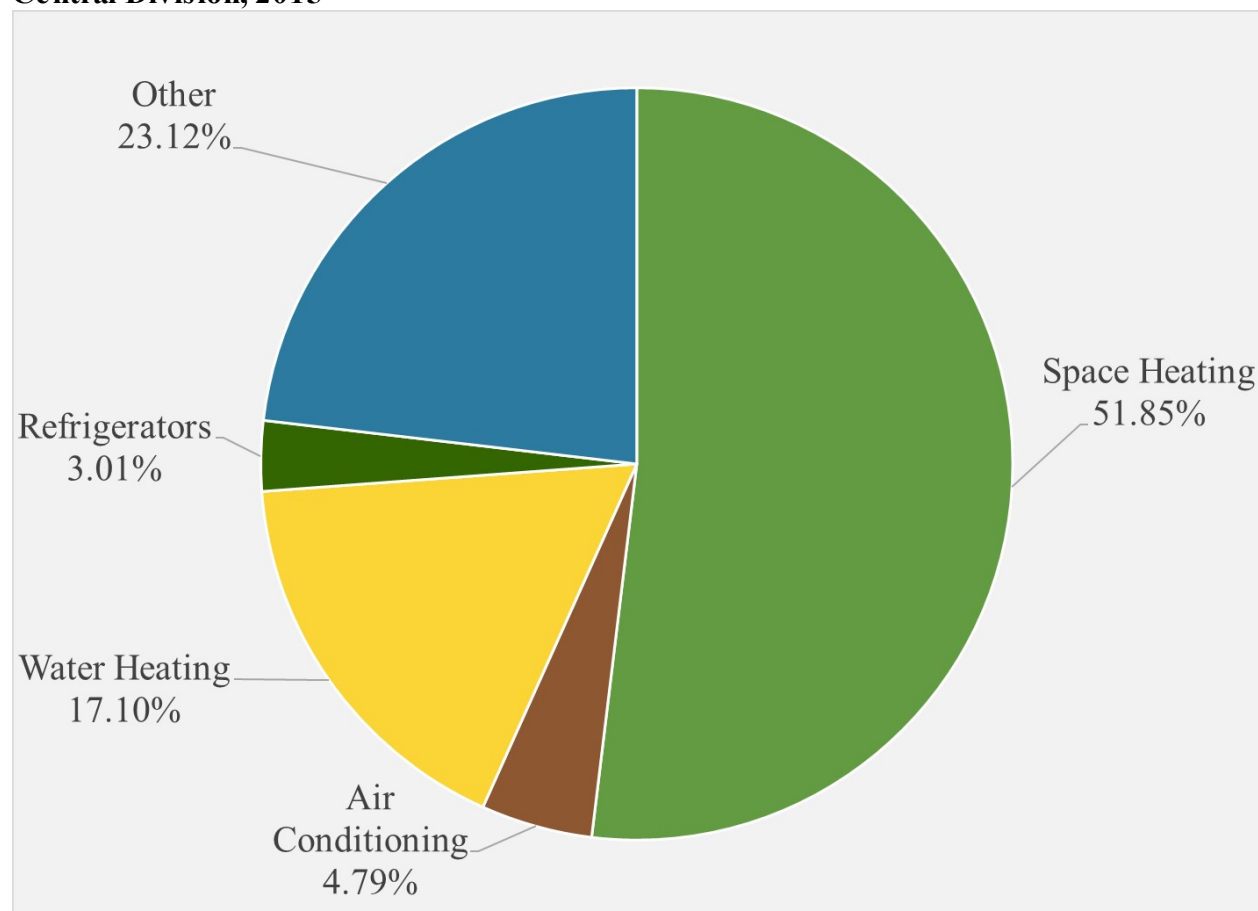
Figure 2.2 and Figure 2.3 show household consumption by end use in the U.S. and the West North Central division, respectively. The data are from the U.S. Energy Information Administration's (EIA) Residential Energy Consumption Survey. Space heating was the largest end use (43.29% and 51.85% of the respective totals for the U.S. and West North Central division), followed by the "other" category (26.22% and 23.12% of the respective totals).¹⁸

Figure 2.2. Total Household Site Energy Consumption by End Use in the U.S., 2015



Source: U.S. Energy Information Administration. 2018. "[Table CE3.1 Annual household site end-use consumption in the U.S.—totals and averages, 2015](#)." 2015 Residential Energy Consumption Survey: Energy Consumption and Expenditures Tables. Page 1.

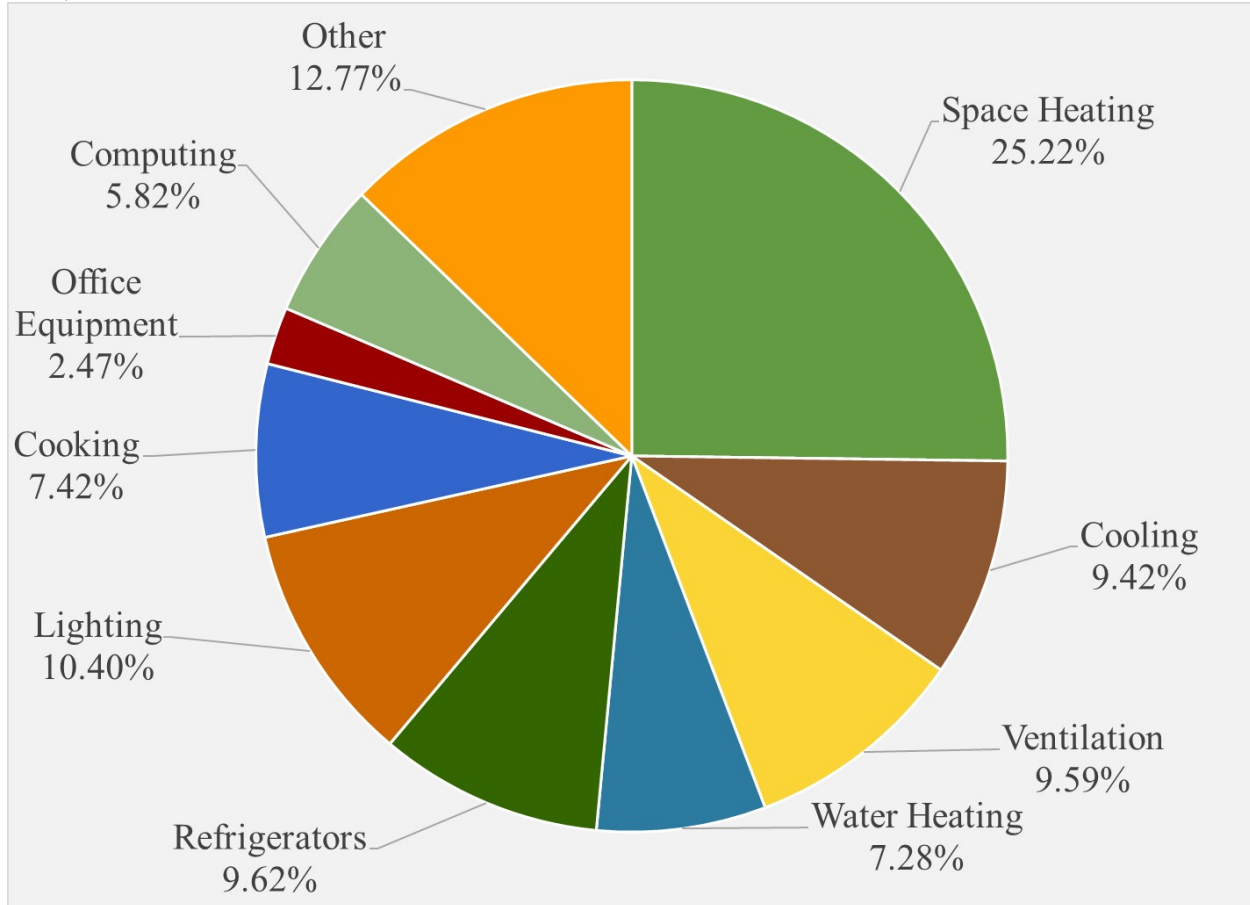
Figure 2.3. Total Household Site Energy Consumption by End Use in the West North Central Division, 2015



Source: U.S. Energy Information Administration. 2018. "[Table CE3.1 Annual household site end-use consumption in the U.S.—totals and averages, 2015](#)." *2015 Residential Energy Consumption Survey: Energy Consumption and Expenditures Tables*. Page 1.

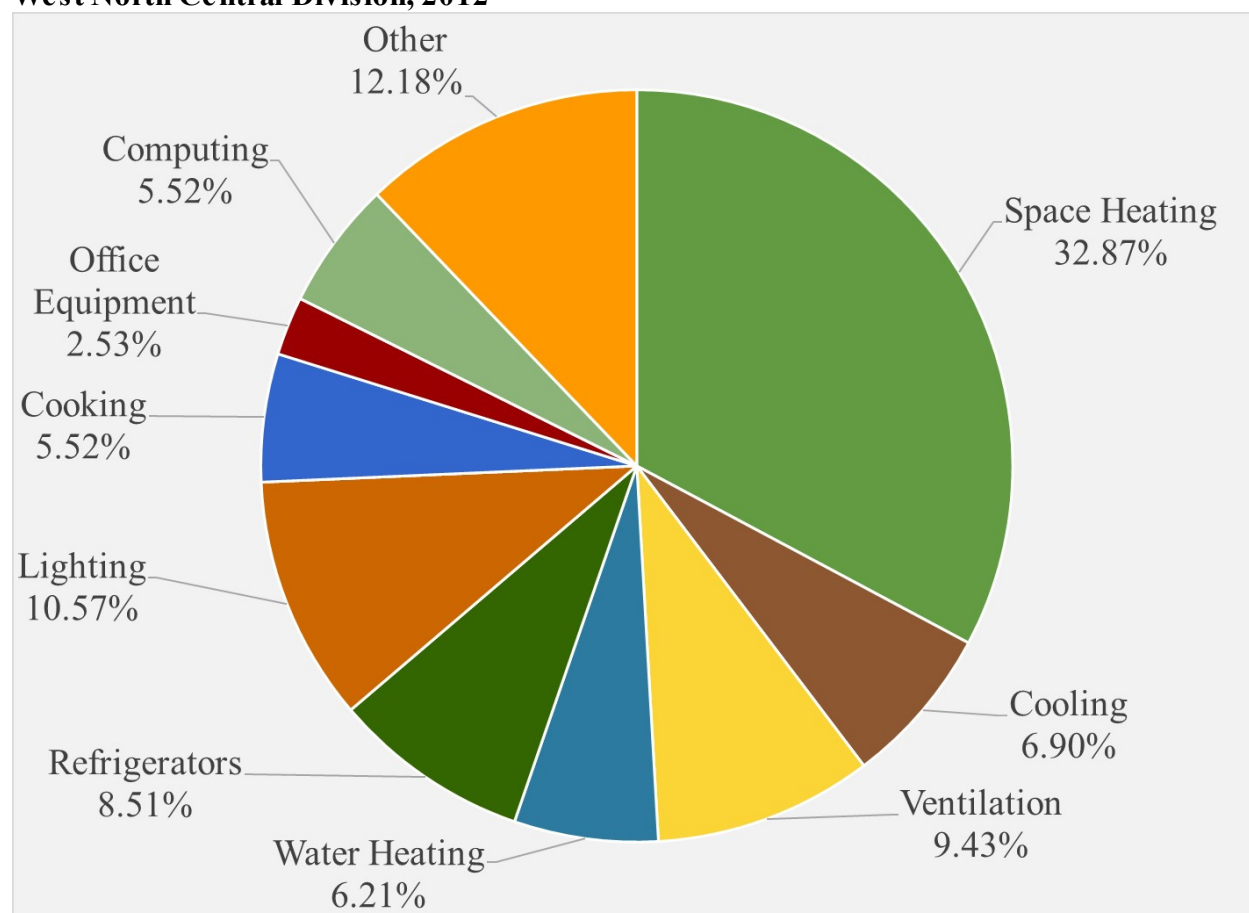
Figure 2.4 and Figure 2.5 show commercial building consumption by end use in the U.S. and the West North Central division, respectively. The data are from EIA's Commercial Buildings Energy Consumption Survey. Space heating was the largest end use (25.22% and 32.87% of the respective totals for the U.S. and West North Central division), followed by the "other" category (12.77% and 12.18% of the respective totals).¹⁹ EIA will release more recent data on this sector through 2021.²⁰

Figure 2.4. Total Major Fuel Consumption by End Use in Commercial Buildings in the U.S., 2012



Source: U.S. Energy Information Administration. 2019. "[Table E1. Major fuel consumption \(Btu\) by end use, 2012.](#)" Commercial Buildings Energy Consumption Survey (CBECS).

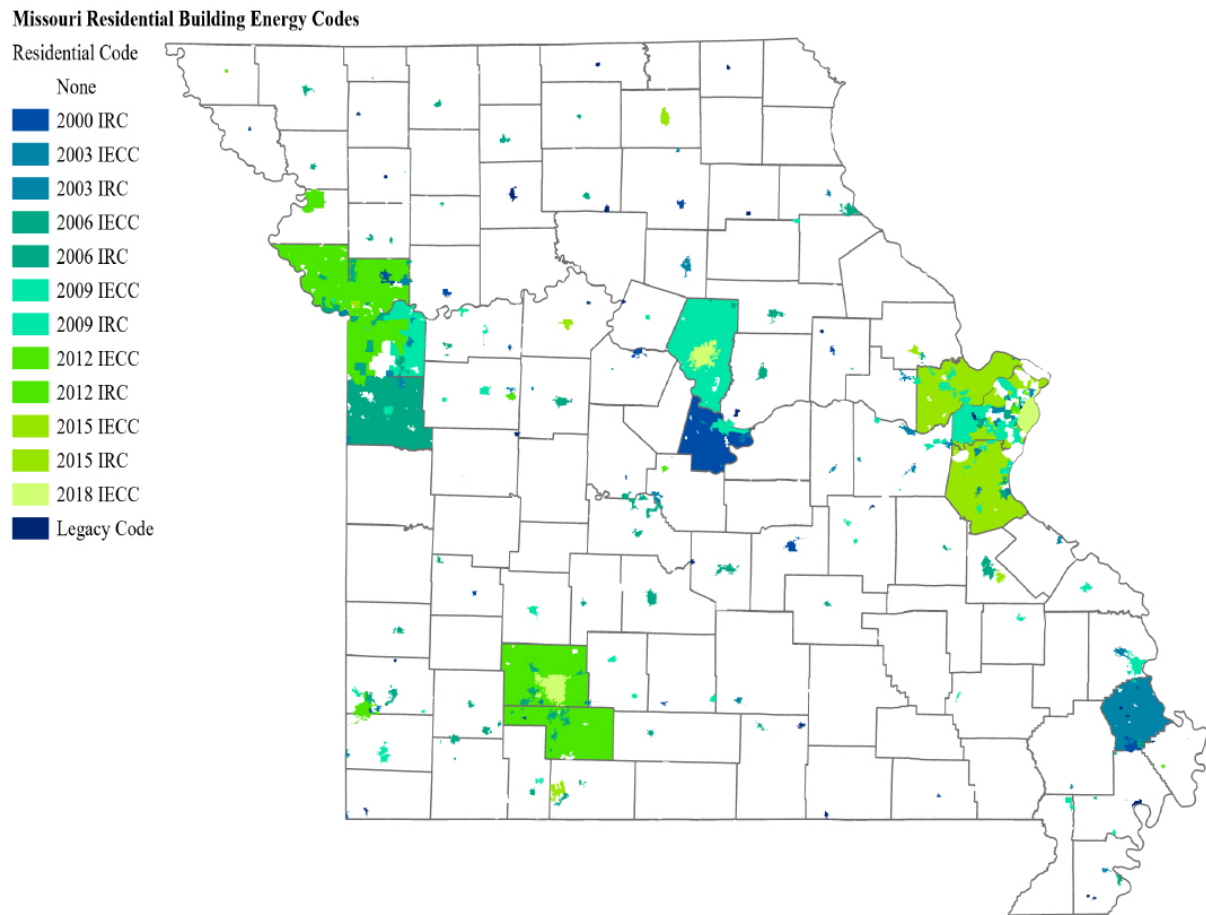
Figure 2.5. Total Major Fuel Consumption by End Use in Commercial Buildings in the West North Central Division, 2012



Source: U.S. Energy Information Administration. 2019. "[Table E1. Major fuel consumption \(Btu\) by end use, 2012.](#)" Commercial Buildings Energy Consumption Survey (CBECS).

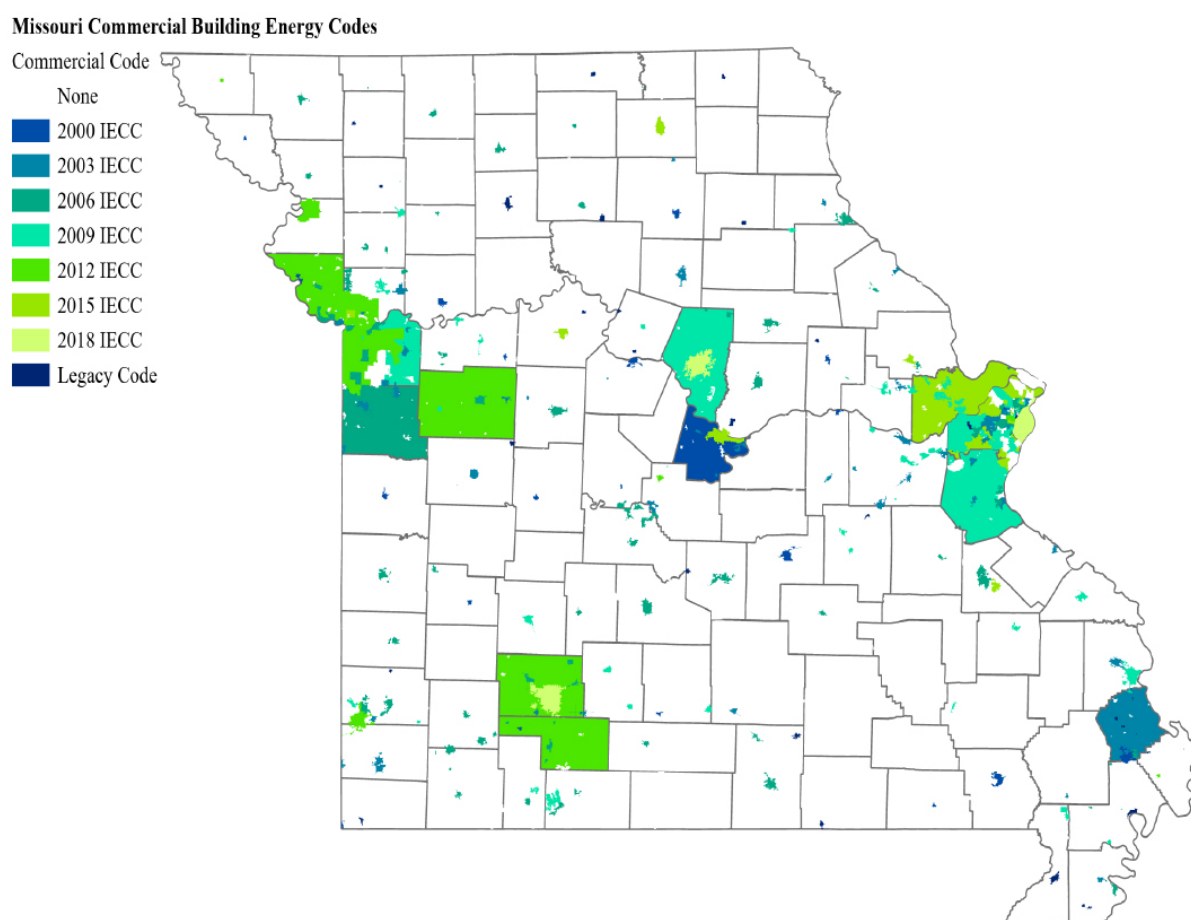
The State of Missouri Data Portal offers building code data for cities and counties, last updated July 2018 and April 2017, respectively. According to these data and supplemental data from the Midwest Energy Efficiency Alliance, more than 100 Missouri municipalities and nine Missouri counties have implemented 2009 International Energy Conservation Code (IECC) or more recent/equivalent residential building energy codes (i.e., the International Residential Code, or IRC). More than 100 Missouri municipalities and nine Missouri counties have implemented 2009 IECC or more recent/equivalent commercial building energy codes. One-hundred and one of the state's counties have not implemented commercial or residential building energy codes. Class 3 and Class 4 counties, representing approximately 93 of Missouri's counties, do not have authority to implement energy codes pursuant to Section 64.170, RSMo. Generally, energy code adoption appears to be related to population density. Most of the county jurisdictions that have implemented building energy codes in Missouri encompass large metropolitan areas. Similarly, municipal areas that have implemented building energy codes tend to be concentrated around areas of higher population.²¹ See Figure 2.6 and Figure 2.7. Note that "legacy code" refers to codes that predate the IECC, IRC and International Building Code.²²

Figure 2.6. Jurisdictions With Local Residential Building Codes in Missouri



Sources: Missouri Department of Economic Development. 2017. "[County Building Codes for Missouri](#)." State of Missouri Data Portal.
Missouri Department of Economic Development. 2018. "[City Building Codes for Missouri](#)." State of Missouri Data Portal.
Supplemental data provided by the Midwest Energy Efficiency Alliance.

Figure 2.7. Jurisdictions With Local Commercial Building Codes in Missouri



Sources: Missouri Department of Economic Development. 2017. “[County Building Codes for Missouri](#).” State of Missouri Data Portal.
 Missouri Department of Economic Development. 2018. “[City Building Codes for Missouri](#).” State of Missouri Data Portal.
 Supplemental data provided by the Midwest Energy Efficiency Alliance.

b. Electricity

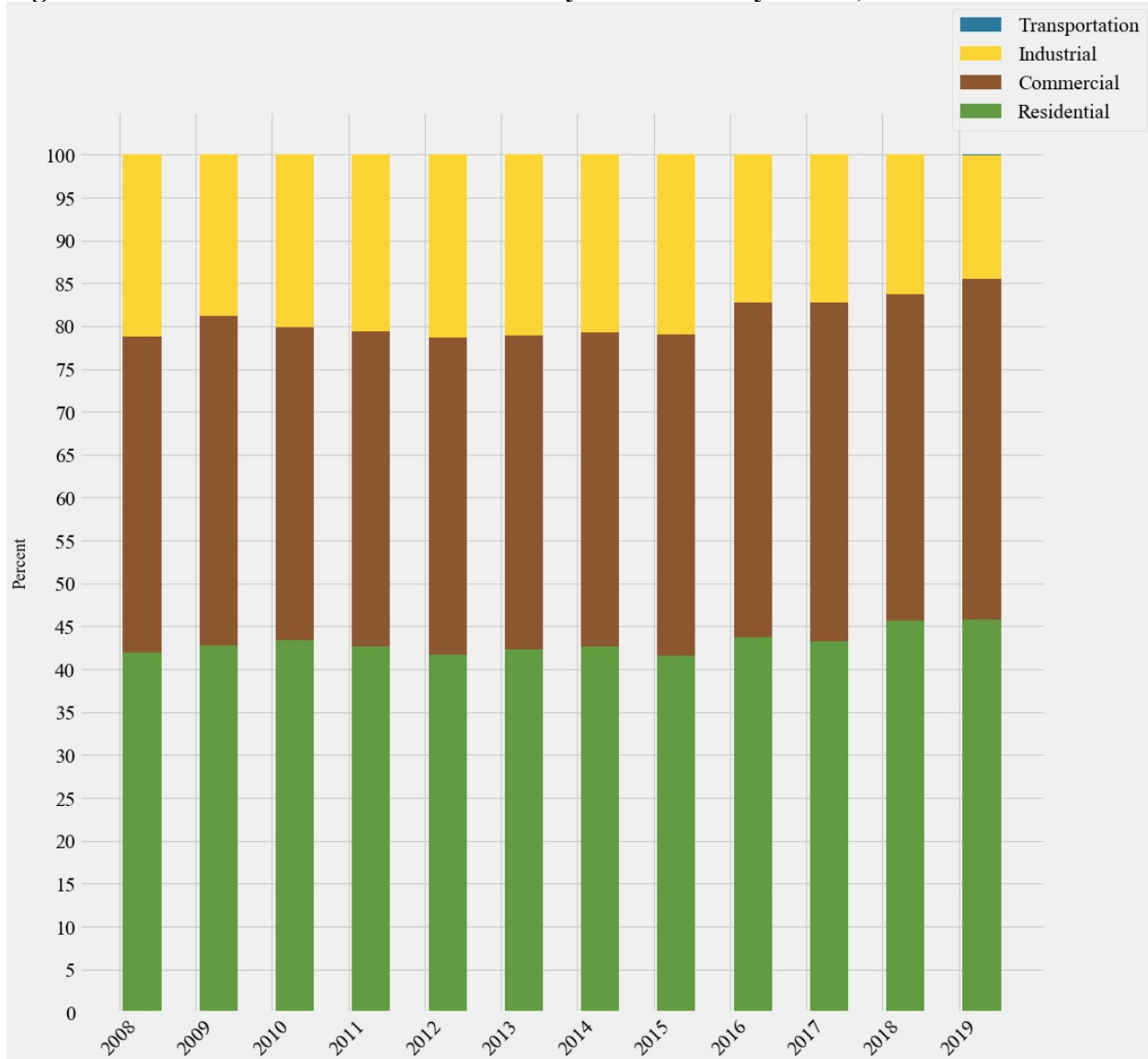
Caution should be exercised when comparing electricity prices between states, as multiple factors affect the prices paid by consumers. Such factors may include, but are not limited to, levels of capital investment, operations and maintenance expenses, fuel prices, utility electricity generation portfolios, total usage by customer class, and whether or not a state has implemented retail competition. According to EIA, 15 states and the District of Columbia have residential retail competition in the electric sector, and 19 states and the District of Columbia have some retail competition in the commercial and industrial sectors.²³ The data presented below account for each state’s entire electricity sector, which is inclusive of both “unbundled” and full-service provision of electricity.

Comparisons of prices, sales, and revenue by sector and year should also be undertaken carefully when using data from EIA because of changes in electricity customer classifications.²⁴

i. Consumption (Retail Sales) and Customers

In 2019, the share of retail sales of electricity between the residential, commercial and industrial sectors in Missouri stood at 45.7%, 39.7% and 14.5%, respectively. As seen in Figure 2.8, the share of industrial retail sales of electricity was down from 21.3% in 2012. Transportation-related retail sales of electricity²⁵ remained below 0.04% from 2008 through 2019. Total retail sales of electricity in Missouri were highest in 2010 at approximately 86.1 billion kilowatt-hours (kWh), with 2019 sales totaling approximately 77.3 billion kWh.²⁶

Figure 2.8. Share of Retail Sales of Electricity in Missouri by Sector, 2008-2019

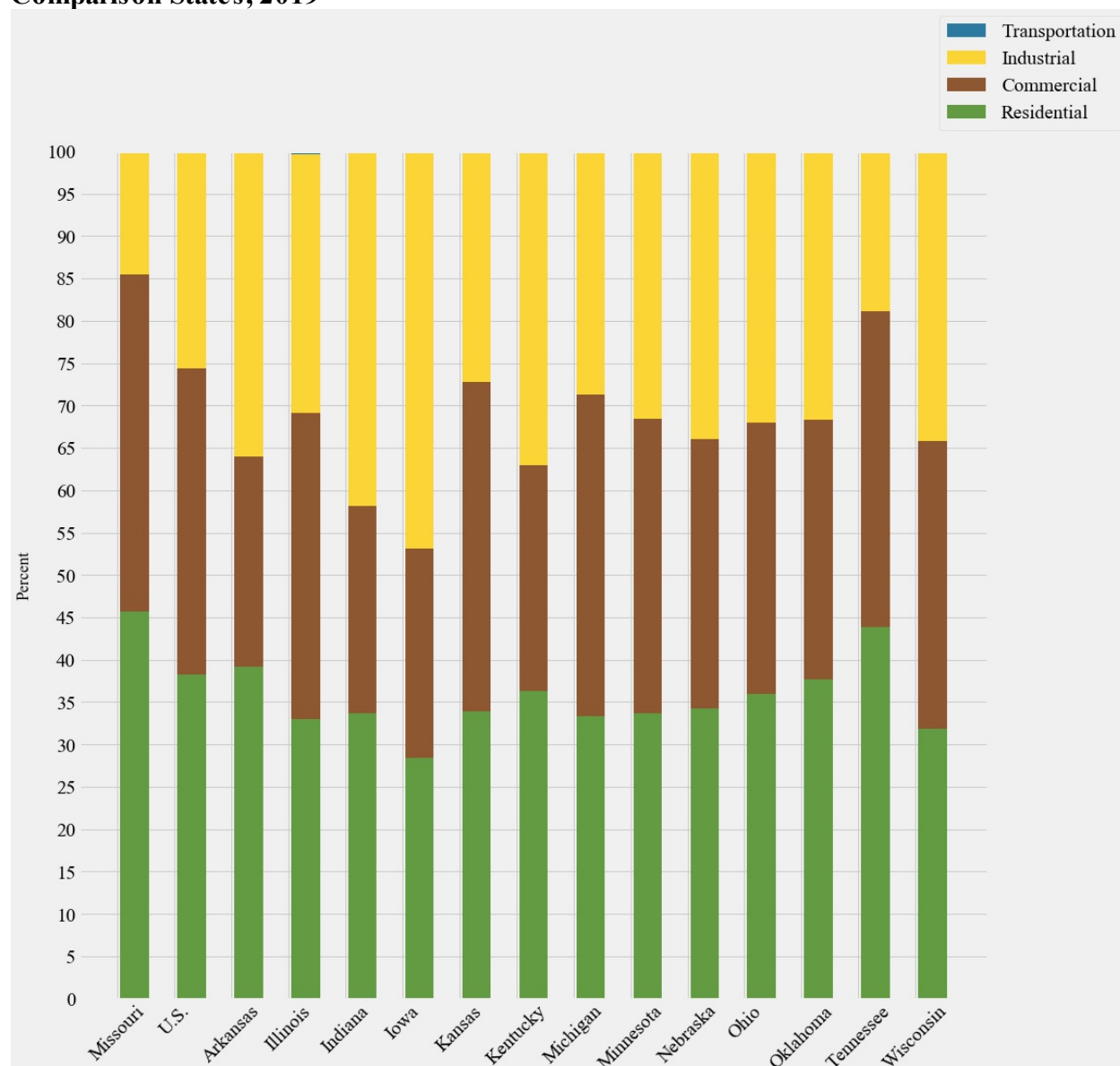


Source: U.S. Energy Information Administration. 2020. "[Retail sales of electricity](#)." Electricity Data Browser.

The 2019 industrial share of retail electricity sales in Missouri was the smallest of the comparison states. The largest share, 46.9%, was in Iowa, although the highest absolute kWh value for industrial retail electricity sales (and total retail electricity sales) was in Ohio.

Transportation's share of retail electricity sales was relatively small in all of the comparison states, with Illinois' 0.42% representing the largest figure in that sector. See Figure 2.9.²⁷

Figure 2.9. Share of Retail Sales of Electricity by Sector in Missouri, the U.S. and Comparison States, 2019

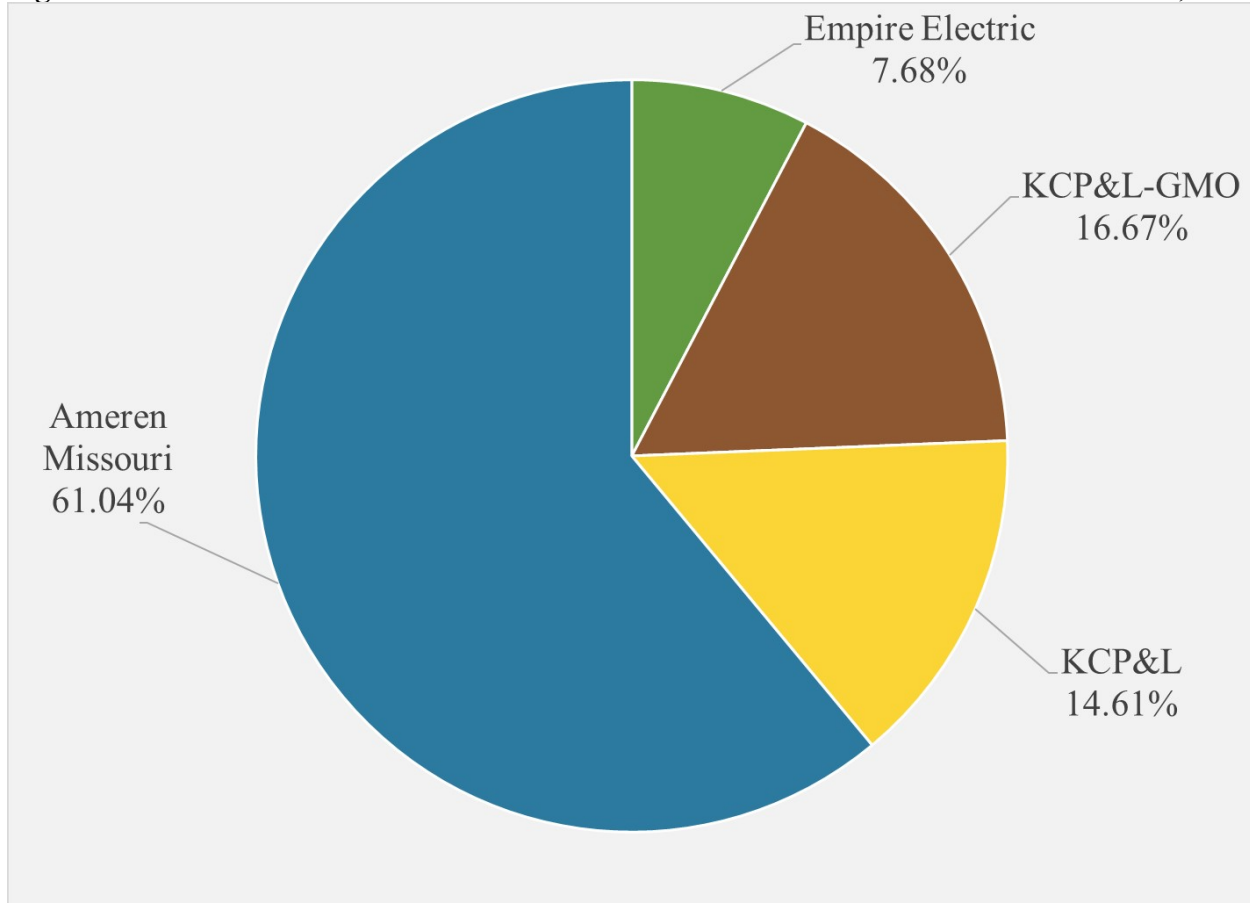


Source: U.S. Energy Information Administration. 2020. "[Retail sales of electricity](#)." Electricity Data Browser.

Based on 2018 data, investor-owned utilities served most of Missouri's customers and made the most sales on a megawatt-hour (MWh)²⁸ basis, followed by member-owned rural electric cooperatives and municipal utilities.²⁹ The investor-owned utilities in Missouri are Union Electric Company d/b/a Ameren Missouri, Evergy Missouri Metro (formerly Kansas City Power & Light Company, or KCP&L) and Evergy Missouri West (formerly KCP&L – Greater Missouri Operations Company, or KCP&L-GMO), and Liberty (i.e., The Empire District Electric Company). Figure 2.10 and Figure 2.11 below show the investor-owned utilities' 2018 shares of

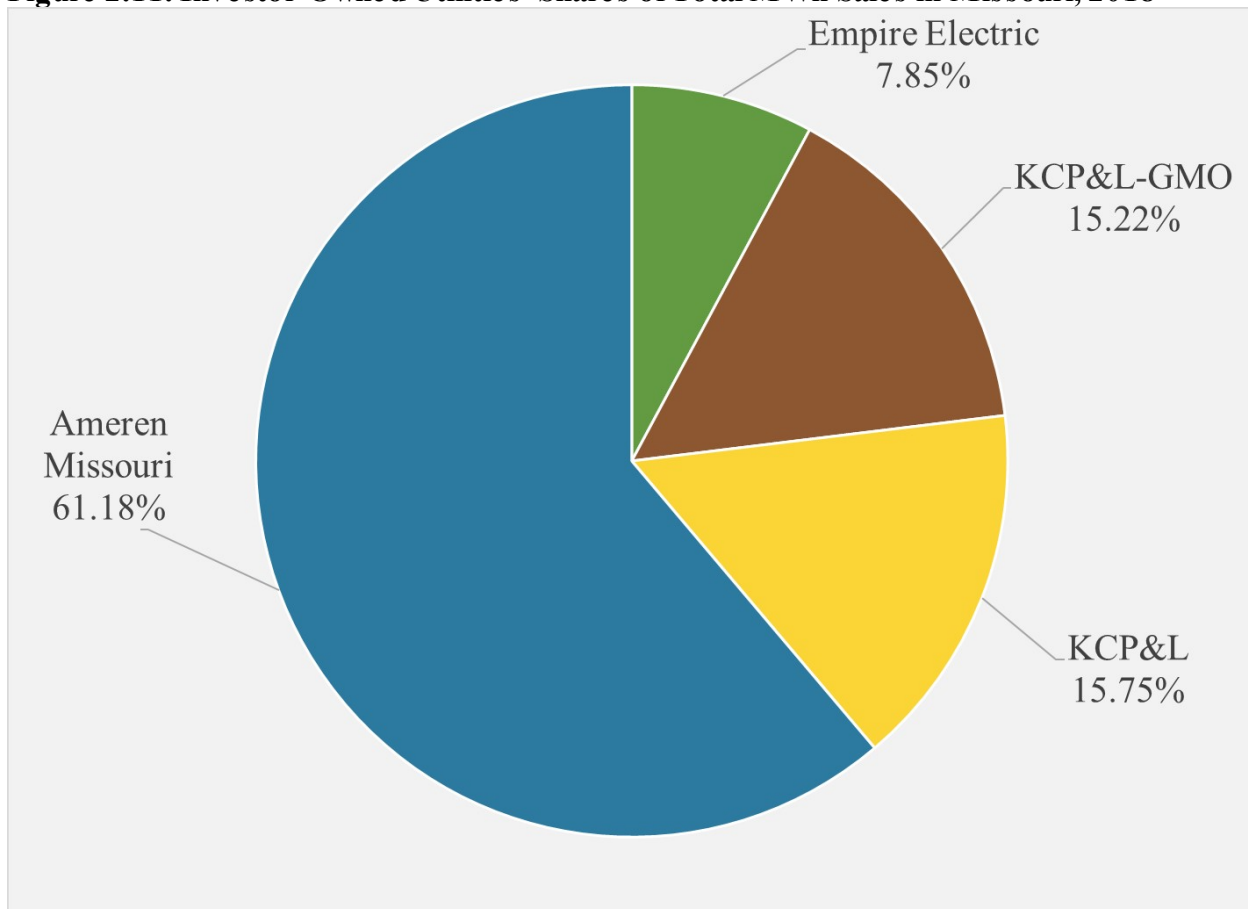
total customers and total MWh sales, respectively. Ameren Missouri had the largest share of customers at 61.04% of the total for investor-owned utilities, as well as the largest share of total MWh sales at 61.18% of the total for investor-owned utilities.³⁰

Figure 2.10. Investor-Owned Utilities' Shares of Total Electric Customers in Missouri, 2018



Source: Missouri Public Service Commission. 2019. [PSC Annual Report 2019](#). Page 41.

Figure 2.11. Investor-Owned Utilities' Shares of Total MWh Sales in Missouri, 2018

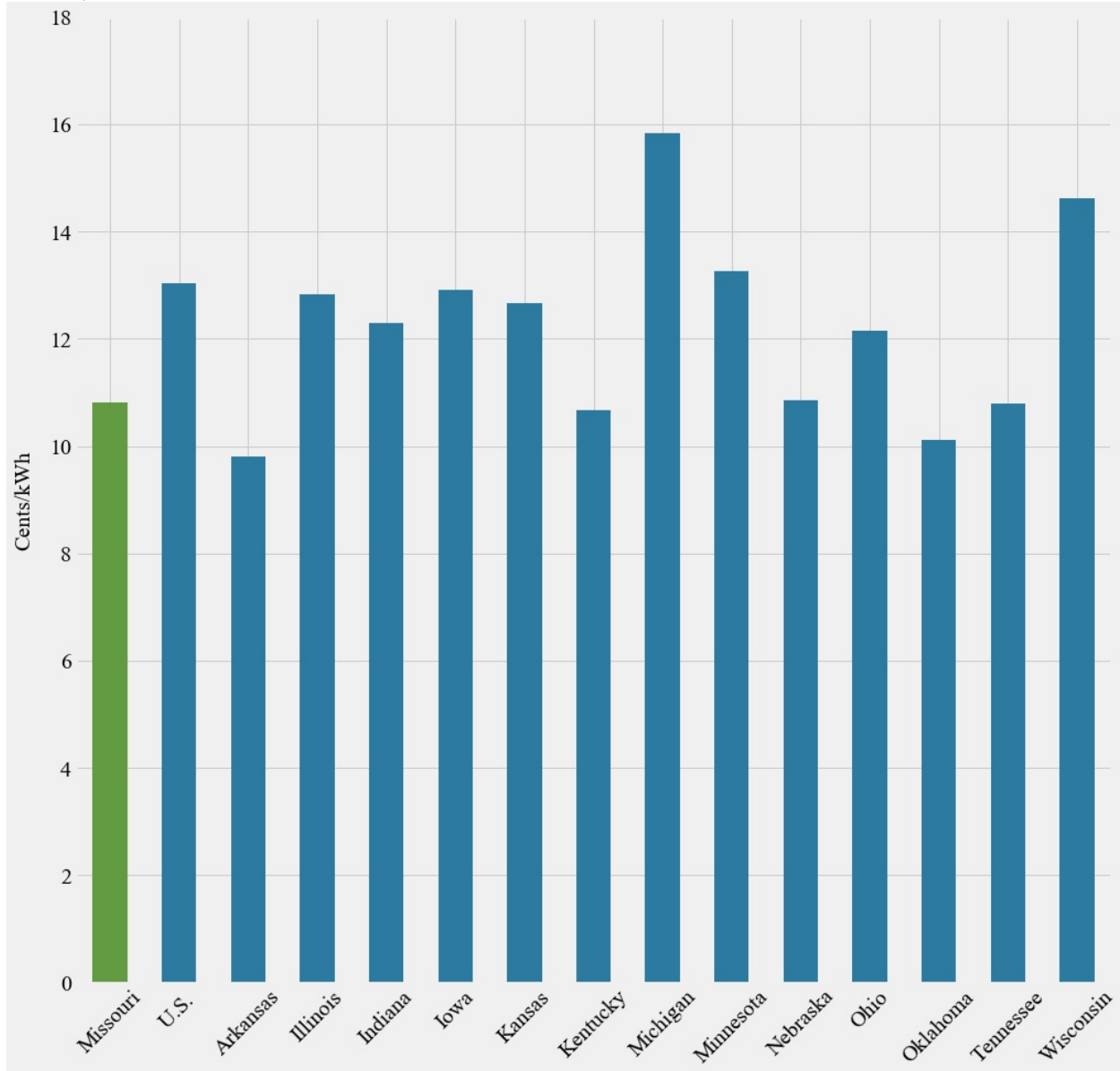


Source: Missouri Public Service Commission. 2019. [PSC Annual Report 2019](#). Page 41.

ii. Prices and Expenditures (Revenue)

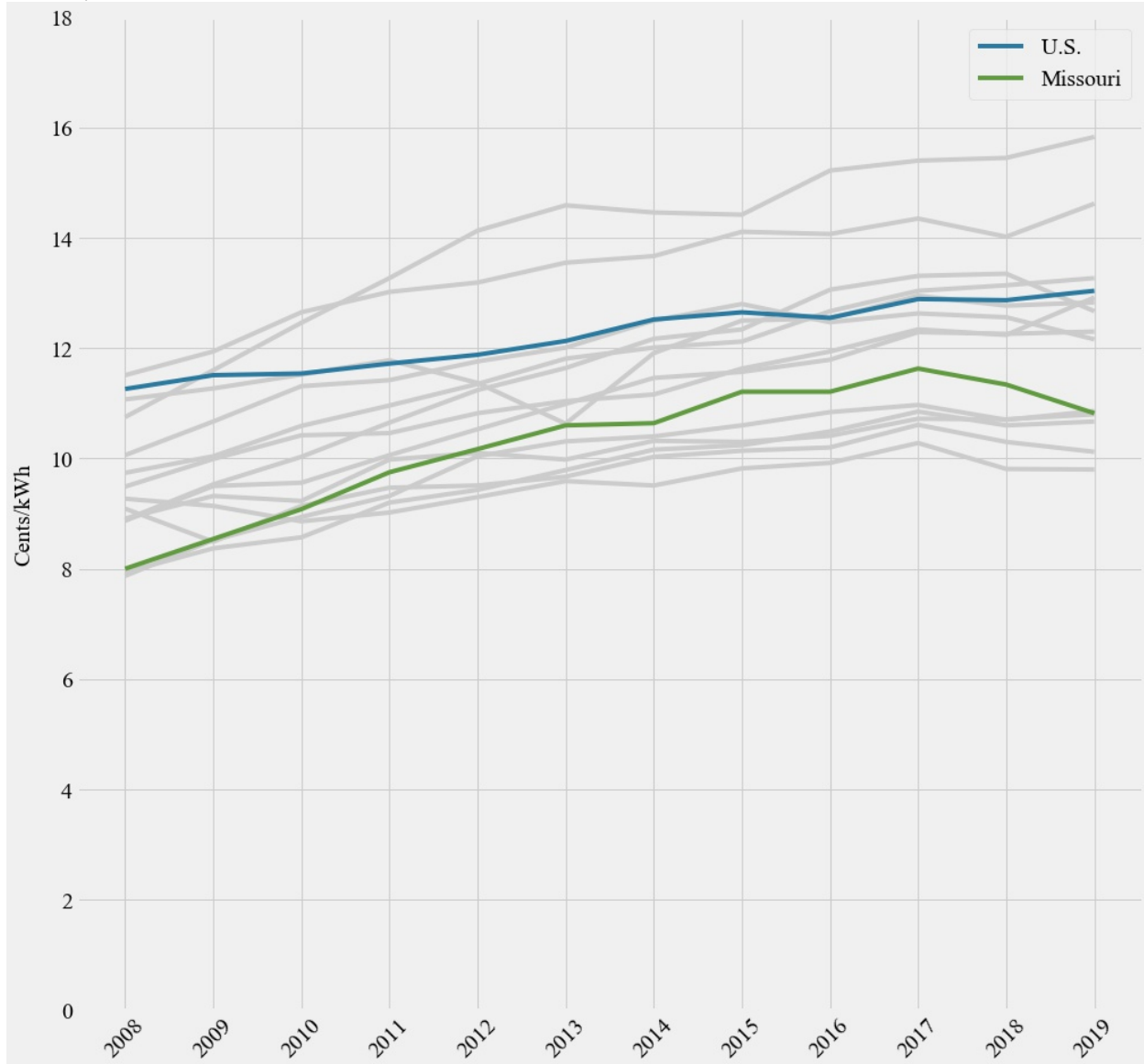
Missouri's 2019 average residential electricity price of 10.82 cents-per-kilowatt-hour (cents/kWh) was below the median price in the comparison states. The highest price of the group was in Michigan (15.83 cents/kWh) and the lowest was in Arkansas (9.80 cents/kWh). Missouri's average residential electricity price increased 35.3% between 2008 and 2019. By contrast, Arkansas' average residential electricity price increased by 5.7% over that time period, while Michigan's average residential electricity price increased by 47.3%.³¹

Figure 2.12. Residential Average Electricity Prices in Missouri, the U.S. and Comparison States, 2019



Source: U.S. Energy Information Administration. 2020. "[Average retail price of electricity](#)." Electricity Data Browser.

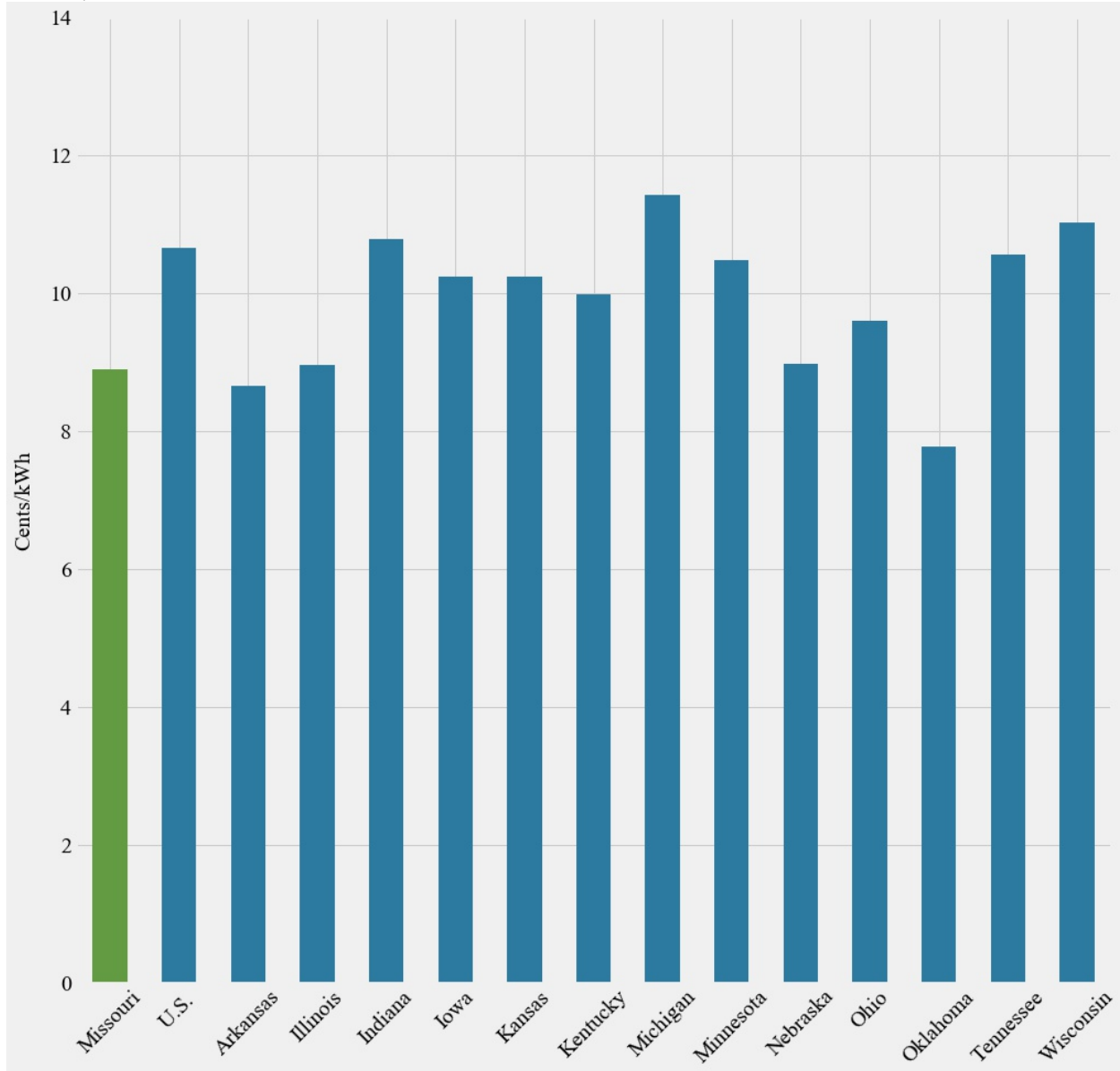
Figure 2.13. Residential Average Electricity Prices in Missouri, the U.S. and Comparison States, 2008-2019



Source: U.S. Energy Information Administration. 2020. "[Average retail price of electricity](#)." Electricity Data Browser.

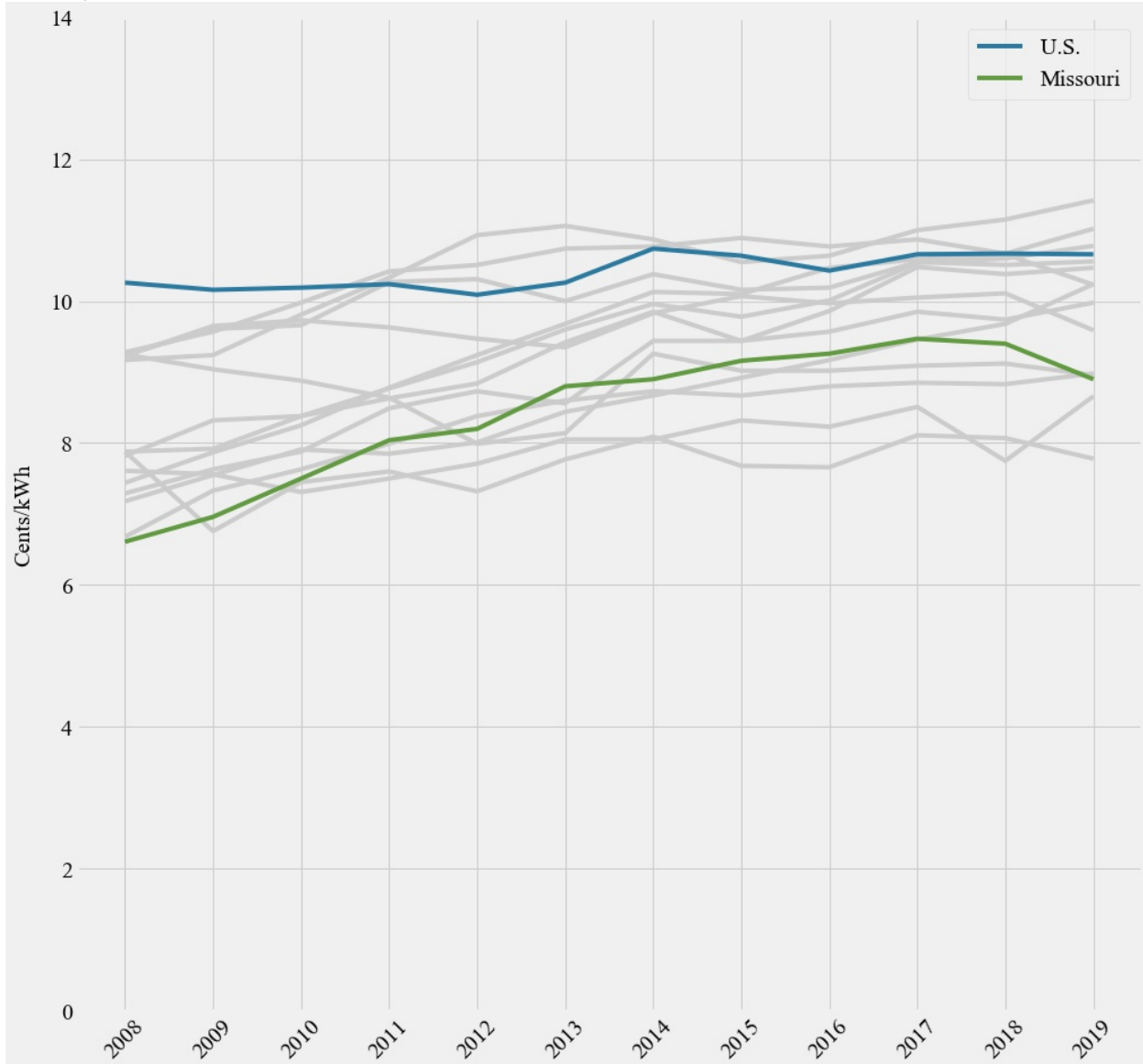
In 2019, Missouri's average commercial electricity price of 8.90 cents/kWh was below the median for the group of comparison states. The highest price was in Michigan (11.42 cents/kWh) and the lowest was in Oklahoma (7.78 cents/kWh). Missouri's average commercial electricity price increased 34.6% between 2008 and 2019. For comparison, Illinois' average commercial electricity price decreased by 3.1% over that time period, while Iowa's average commercial electricity price increased by 42.6%.³²

Figure 2.14. Commercial Average Electricity Prices in Missouri, the U.S. and Comparison States, 2019



Source: U.S. Energy Information Administration. 2020. "[Average retail price of electricity](#)." Electricity Data Browser.

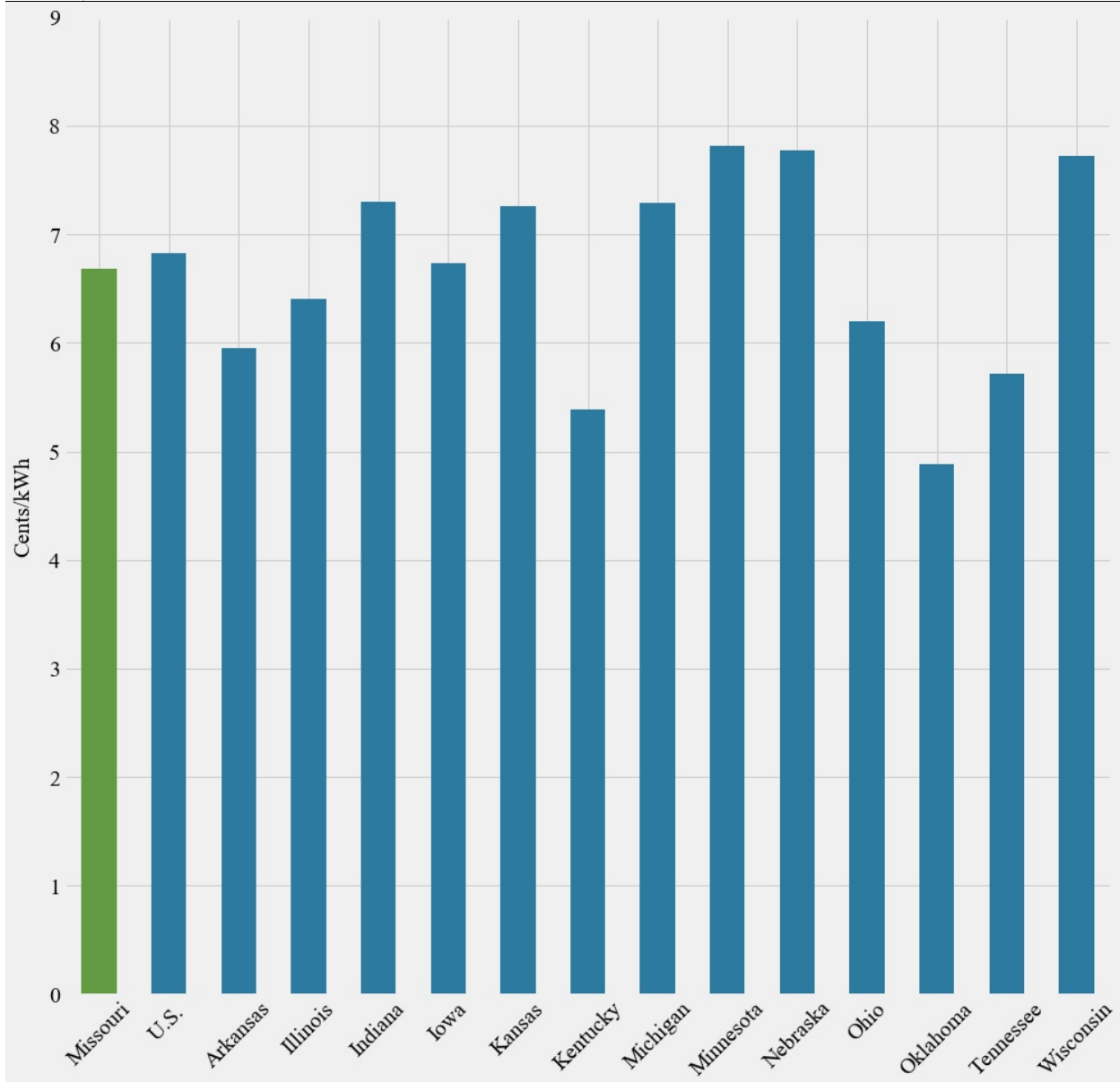
Figure 2.15. Commercial Average Electricity Prices in Missouri, the U.S. and Comparison States, 2008-2019



Source: U.S. Energy Information Administration. 2020. "[Average retail price of electricity](#)." Electricity Data Browser.

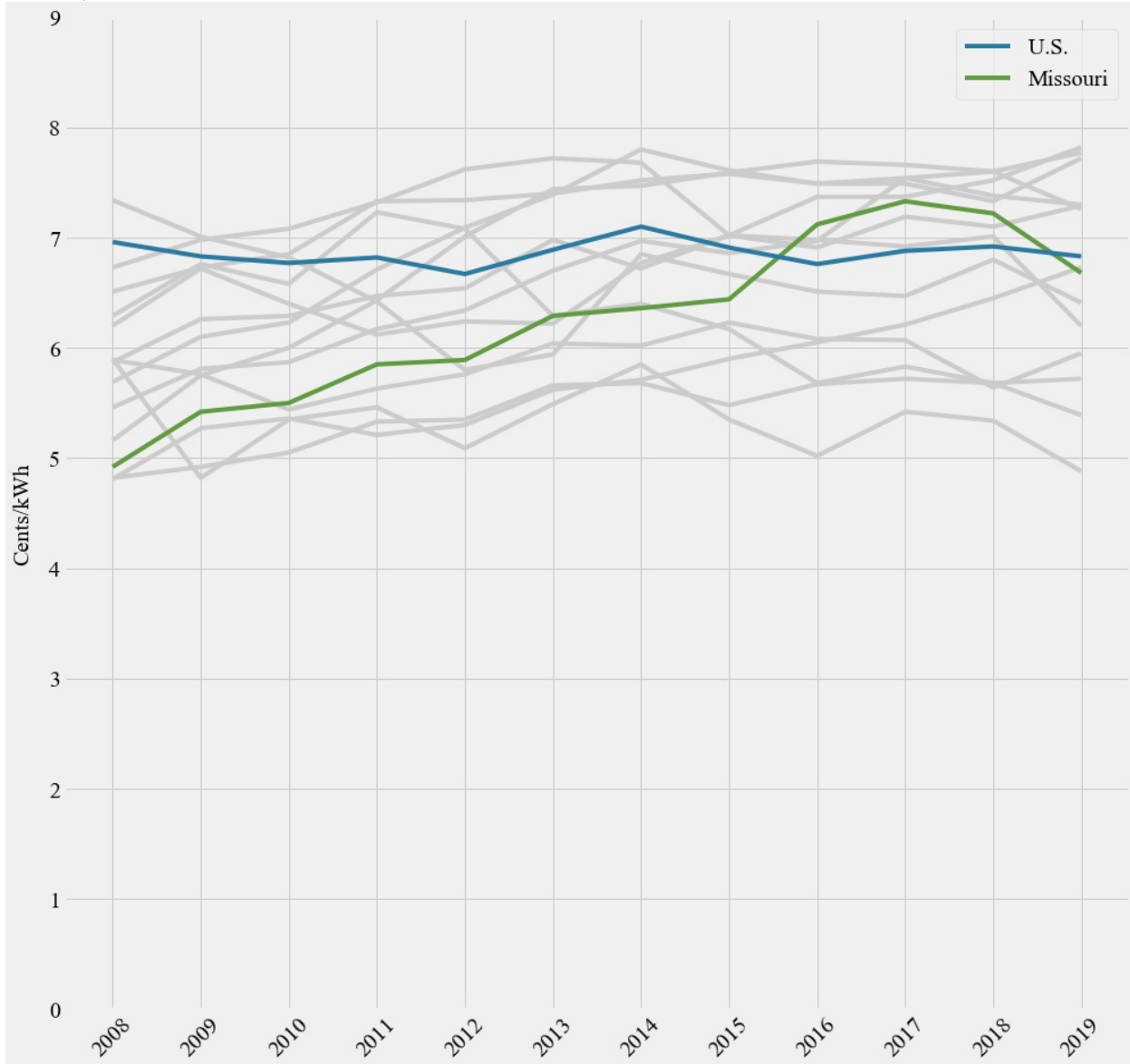
Missouri's 2019 average industrial electricity price of 6.68 cents/kWh was the eighth-highest of the comparison states. The highest price was in Minnesota (7.82 cents/kWh) and the lowest was in Oklahoma (4.88 cents/kWh). Missouri's average industrial electricity price increased 35.8% from 2008 to 2019. In contrast, Oklahoma's average industrial electricity price decreased by 17.3% over that time period, while Nebraska's average industrial electricity price increased by 50.6%.³³

Figure 2.16. Industrial Average Electricity Prices in Missouri, the U.S. and Comparison States, 2019



Source: U.S. Energy Information Administration. 2020. "[Average retail price of electricity](#)." Electricity Data Browser.

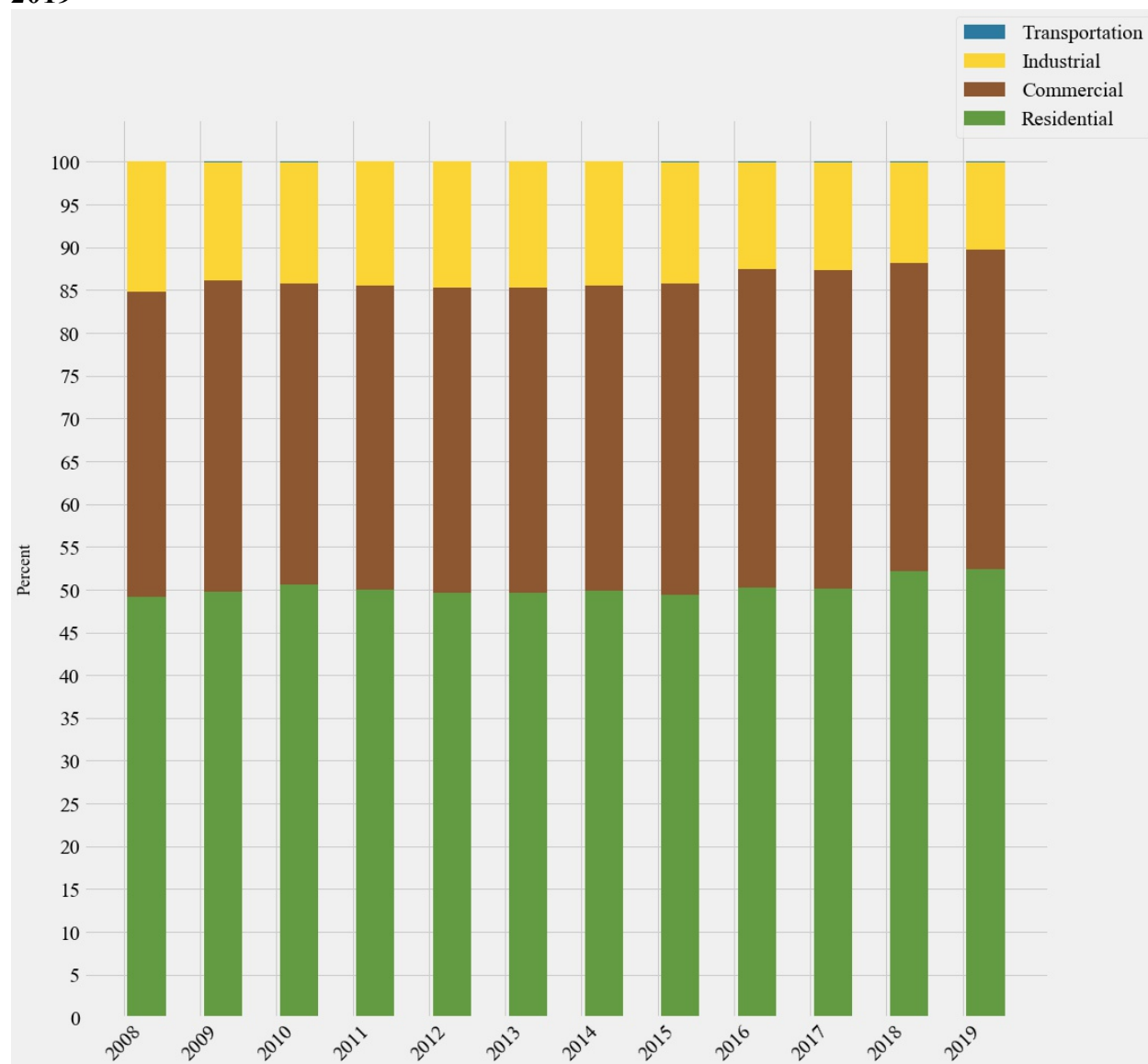
Figure 2.17. Industrial Average Electricity Prices in Missouri, the U.S. and Comparison States, 2008-2019



Source: U.S. Energy Information Administration. 2020. "[Average retail price of electricity.](#)" *Electricity Data Browser*.

In 2019, the share of revenue from retail sales of electricity to the residential, commercial and industrial sectors in Missouri stood at 52.33%, 37.38% and 10.25%, respectively. As seen in Figure 2.18, the share of revenue from retail sales of electricity to the industrial sector was down from 15.24% in 2008. Revenue from retail sales of electricity to the transportation sector remained below 0.03% from 2008 through 2019. During that time period, total revenue from retail sales of electricity in Missouri was highest in 2018 at approximately \$8.1 billion, with 2019 revenue totaling approximately \$7.3 billion.³⁴

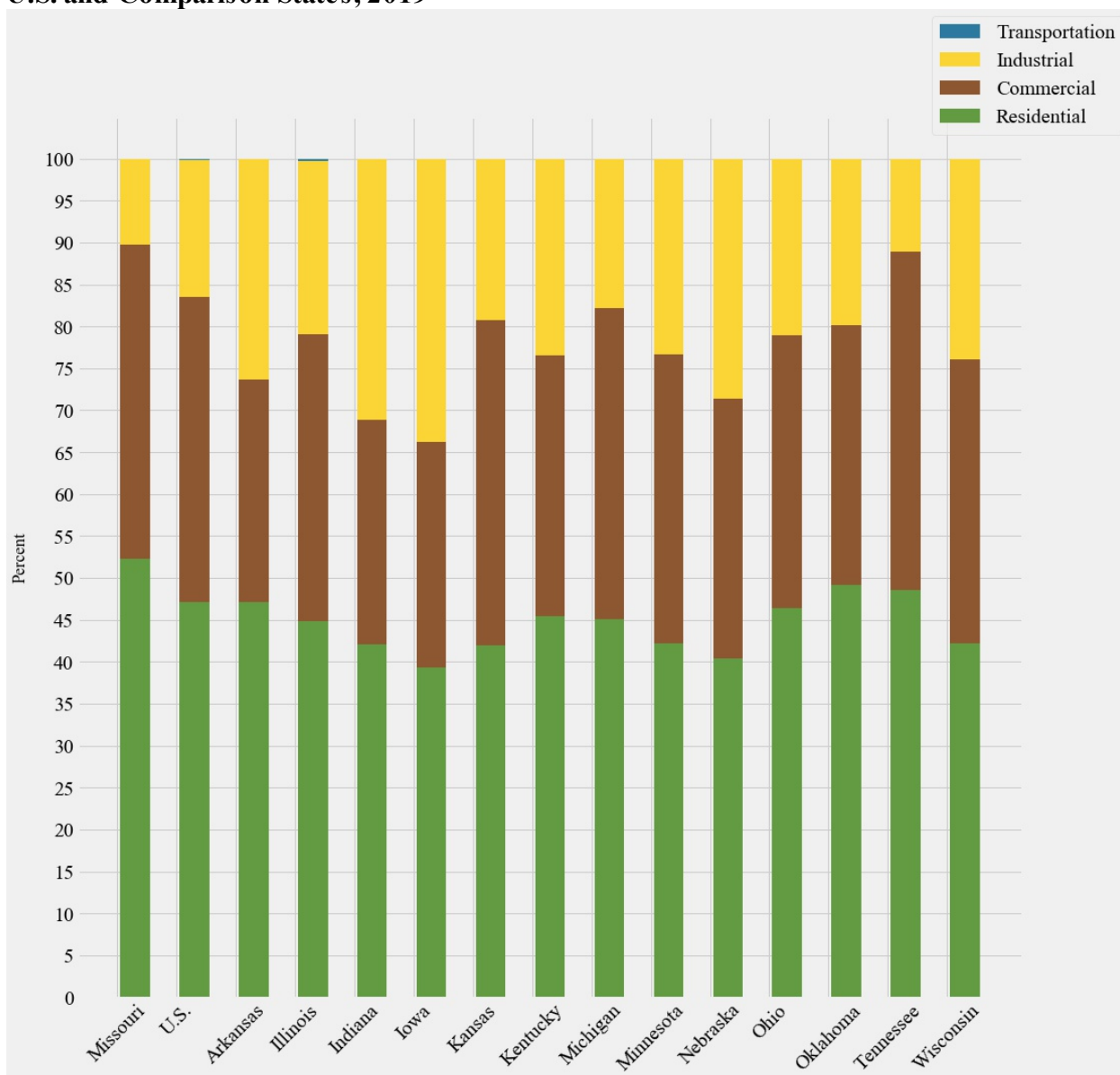
Figure 2.18. Share of Revenue From Retail Sales of Electricity in Missouri by Sector, 2008-2019



Source: U.S. Energy Information Administration. 2020. "[Revenue from retail sales of electricity](#)." Electricity Data Browser.

The 2019 share of revenue from retail electricity sales to the industrial sector in Missouri was the smallest of the group of comparison states. Iowa had the largest share (33.7%), although Indiana had the highest absolute dollar value (almost \$3.0 billion). The share of revenue from retail electricity sales to the transportation sector was relatively small in all of the comparison states, with Illinois' 0.301% representing the largest figure in that sector. See Figure 2.19.³⁵

Figure 2.19. Share of Revenue From Retail Sales of Electricity by Sector in Missouri, the U.S. and Comparison States, 2019



Source: U.S. Energy Information Administration. 2020. "[Revenue from retail sales of electricity.](#)" Electricity Data Browser.

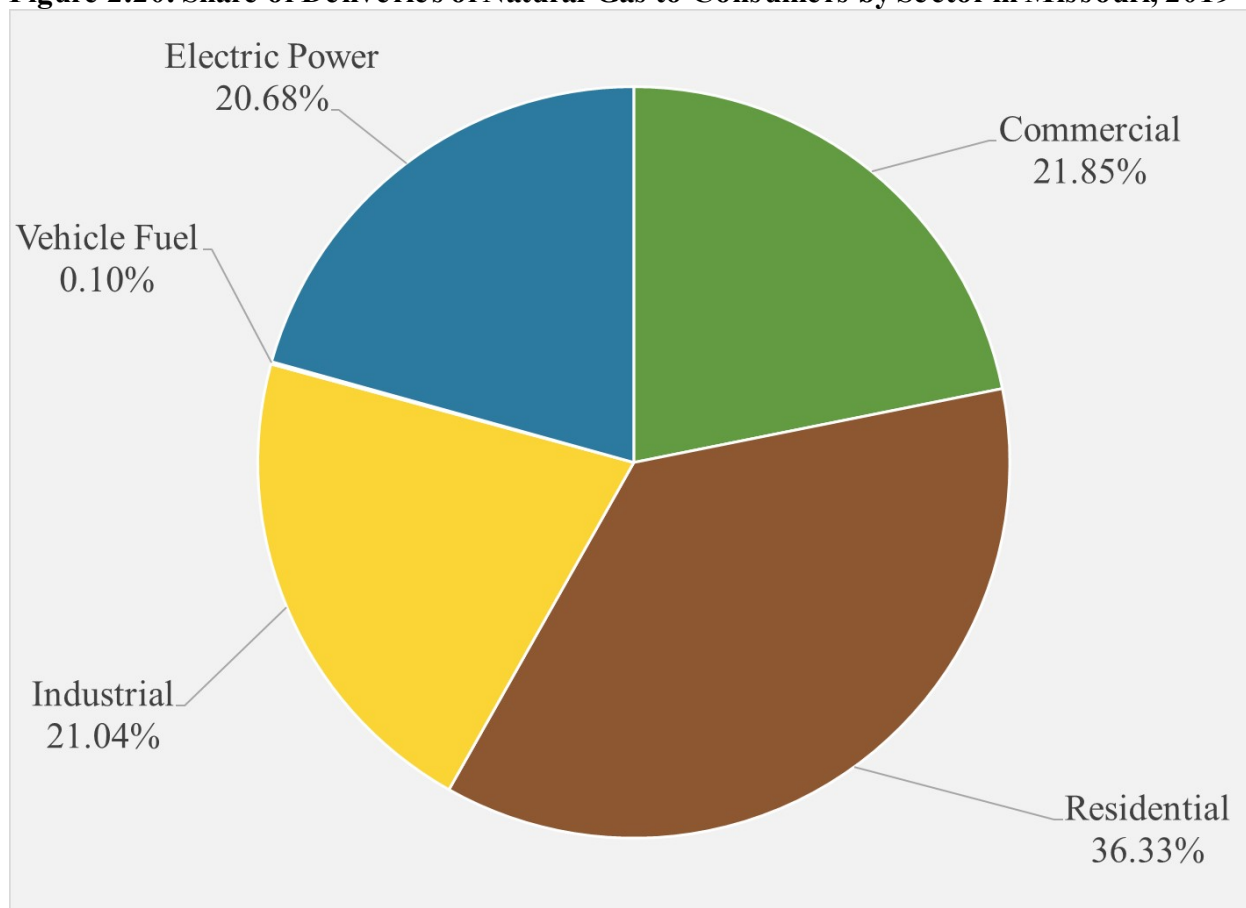
c. Natural Gas³⁶

Caution should be exercised when comparing natural gas prices between states, as multiple factors affect the prices paid by consumers. EIA states that, "As of December 2018, 23 states and the District of Columbia had residential natural gas customer choice programs."³⁷ In Missouri, large-volume customers and aggregations of school customers can receive natural gas through local distribution companies from other suppliers by subscribing to utility transportation service offerings.

i. Consumption (Deliveries)

In 2019, more than 310.3 billion cubic feet (bcf) of natural gas was delivered to Missouri consumers. Figure 2.20 shows the share of natural gas deliveries to consumers by sector in the state. Most natural gas deliveries were to residential consumers, with the commercial, industrial and electric power sectors receiving relatively similar volumes to each other.³⁸ Note that vehicle fuel consumption may also be accounted for under the commercial and industrial sectors.³⁹

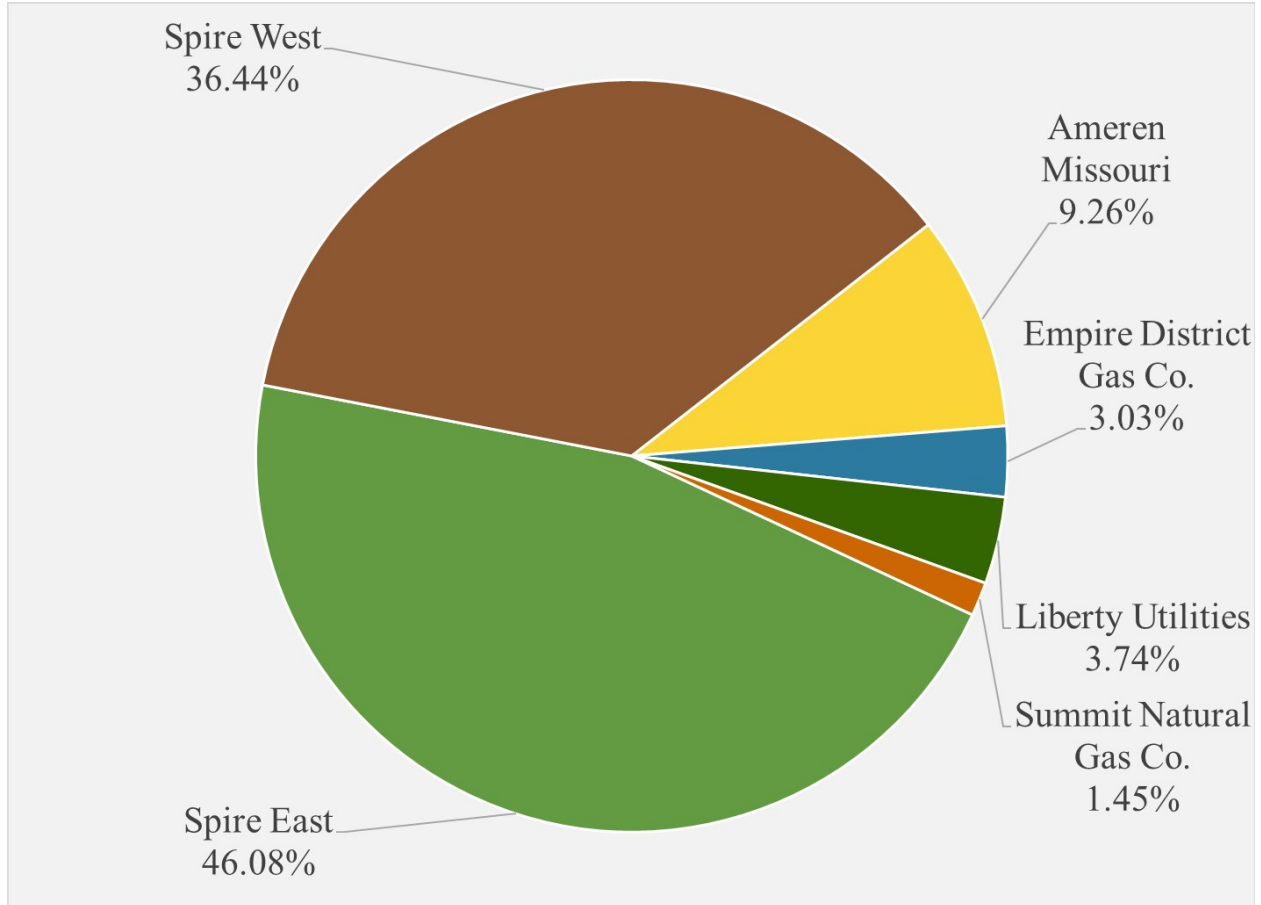
Figure 2.20. Share of Deliveries of Natural Gas to Consumers by Sector in Missouri, 2019



Source: U.S. Energy Information Administration. 2020. "[Natural Gas Summary](#)." Natural Gas.

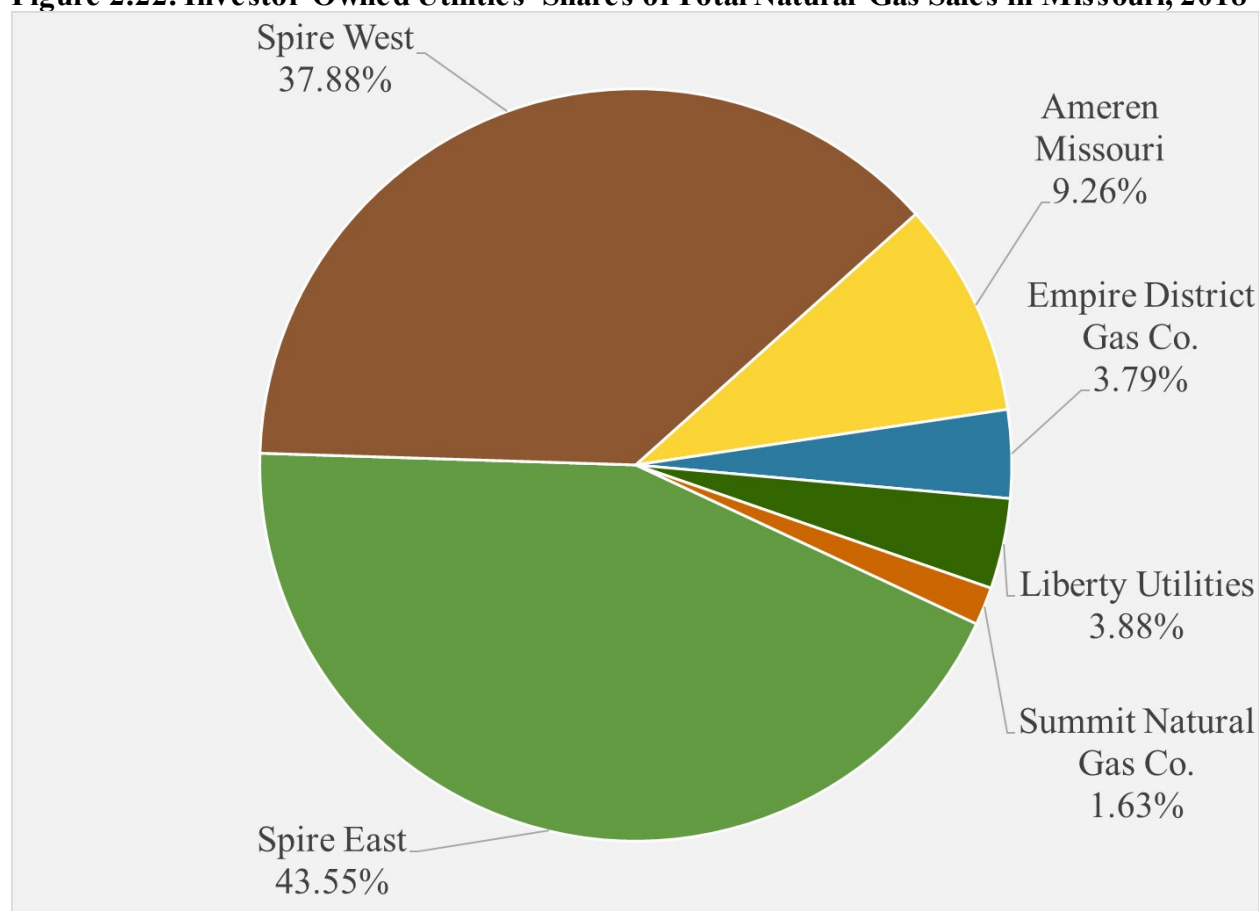
Of the more than 312.7 bcf delivered to Missouri consumers in 2018,⁴⁰ approximately 219.4 bcf, or around 70%, were sold by investor-owned utilities. That year, Spire Missouri East and West served 82.52% of the Missouri natural gas customers served by investor-owned utilities. Sales by Spire Missouri East and West comprised approximately 178.7 bcf, more than all of the other investor-owned natural gas utilities combined at 81.43% of the total investor-owned utility sales.⁴¹ Figure 2.21 depicts the share of total customers by investor-owned utility, while Figure 2.22 presents the share of natural gas sales by investor-owned utility.

Figure 2.21. Investor-Owned Utilities' Shares of Total Natural Gas Customers in Missouri, 2018



Source: Missouri Public Service Commission. 2019. [PSC Annual Report 2019](#). Page 41.

Figure 2.22. Investor-Owned Utilities' Shares of Total Natural Gas Sales in Missouri, 2018

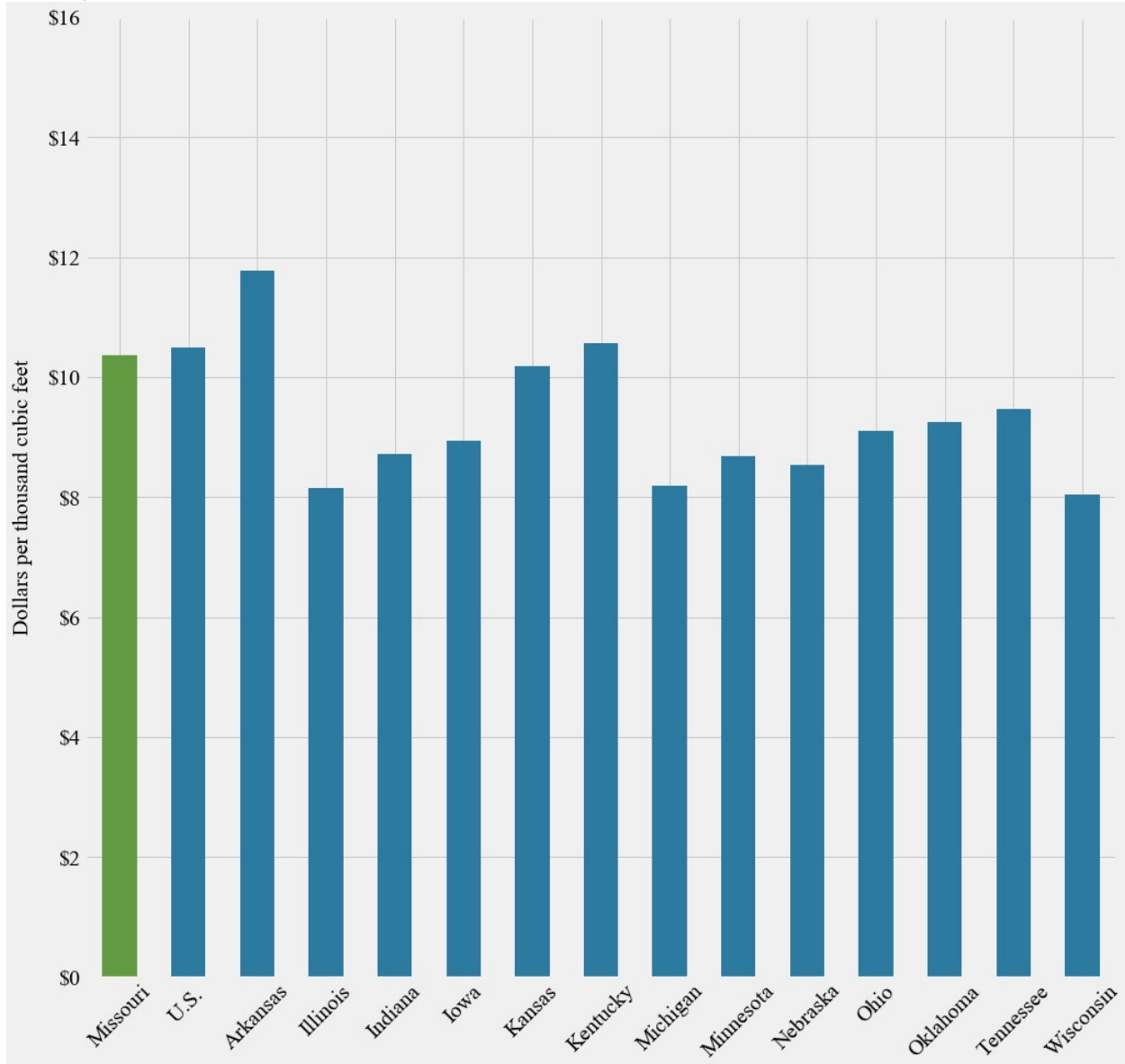


Source: Missouri Public Service Commission. 2019. [PSC Annual Report 2019](#). Page 41.

ii. Residential Prices ⁴²

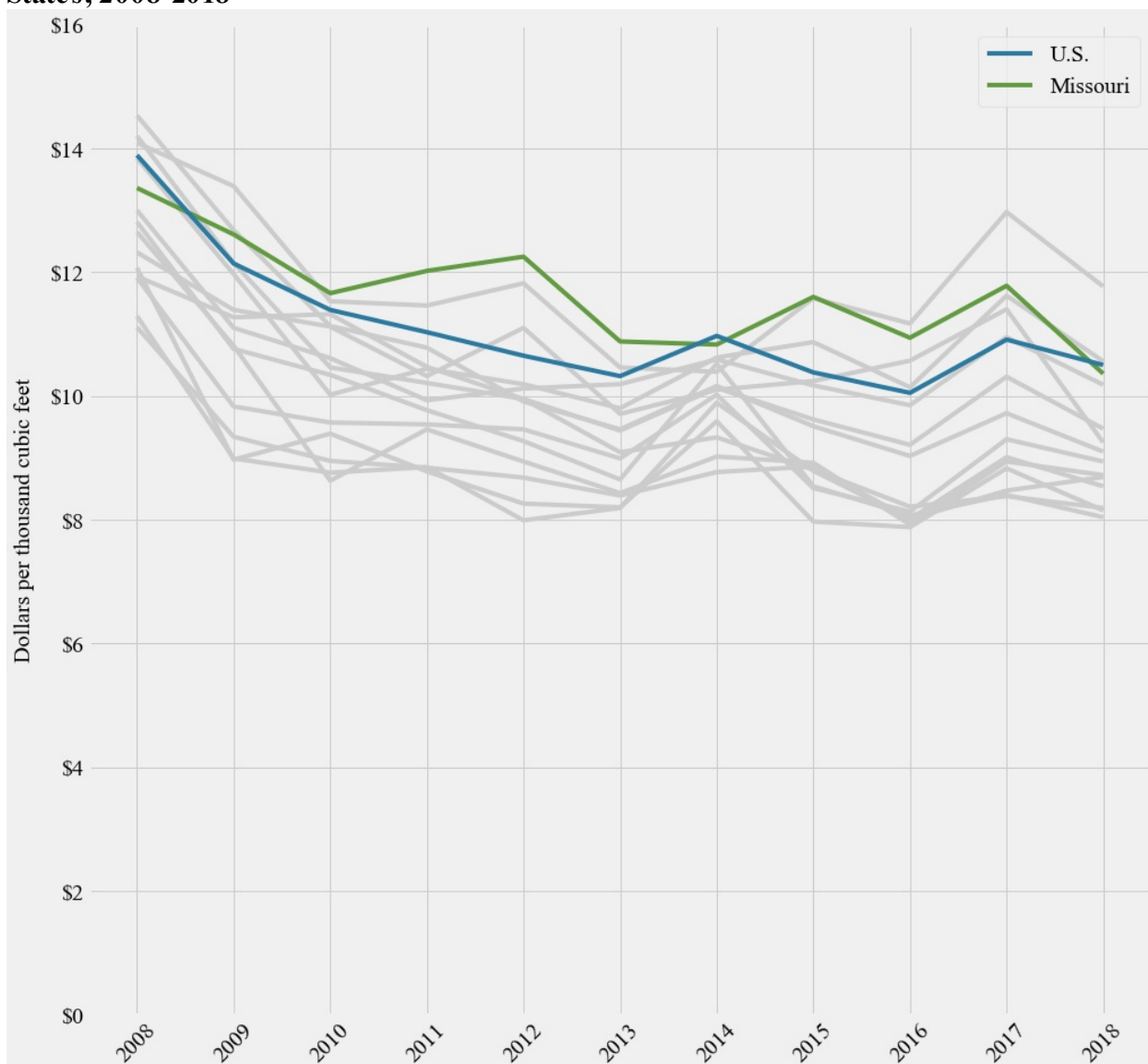
Figure 2.23 and Figure 2.24 compare residential natural gas prices in Missouri with those of surrounding states, the U.S. and Indiana, Michigan, Minnesota, Ohio and Wisconsin. Note that the prices shown may not reflect all residential volumes delivered; for example, the price for Illinois in 2018 represents 86.9% of total volumes delivered.⁴³ Missouri's 2018 residential natural gas price of \$10.36 per thousand cubic feet was the third-highest of the comparison states. The price declined by 22.5% between 2008 and 2018, which was the third-lowest rate of decrease of the comparison states.⁴⁴

Figure 2.23. Residential Natural Gas Prices by State for Missouri, the U.S. and Comparison States, 2018.



Source: U.S. Energy Information Administration. 2020. "[Natural Gas Prices.](#)" Natural Gas.

Figure 2.24. Residential Natural Gas Prices by State for Missouri, the U.S. and Comparison States, 2008-2018

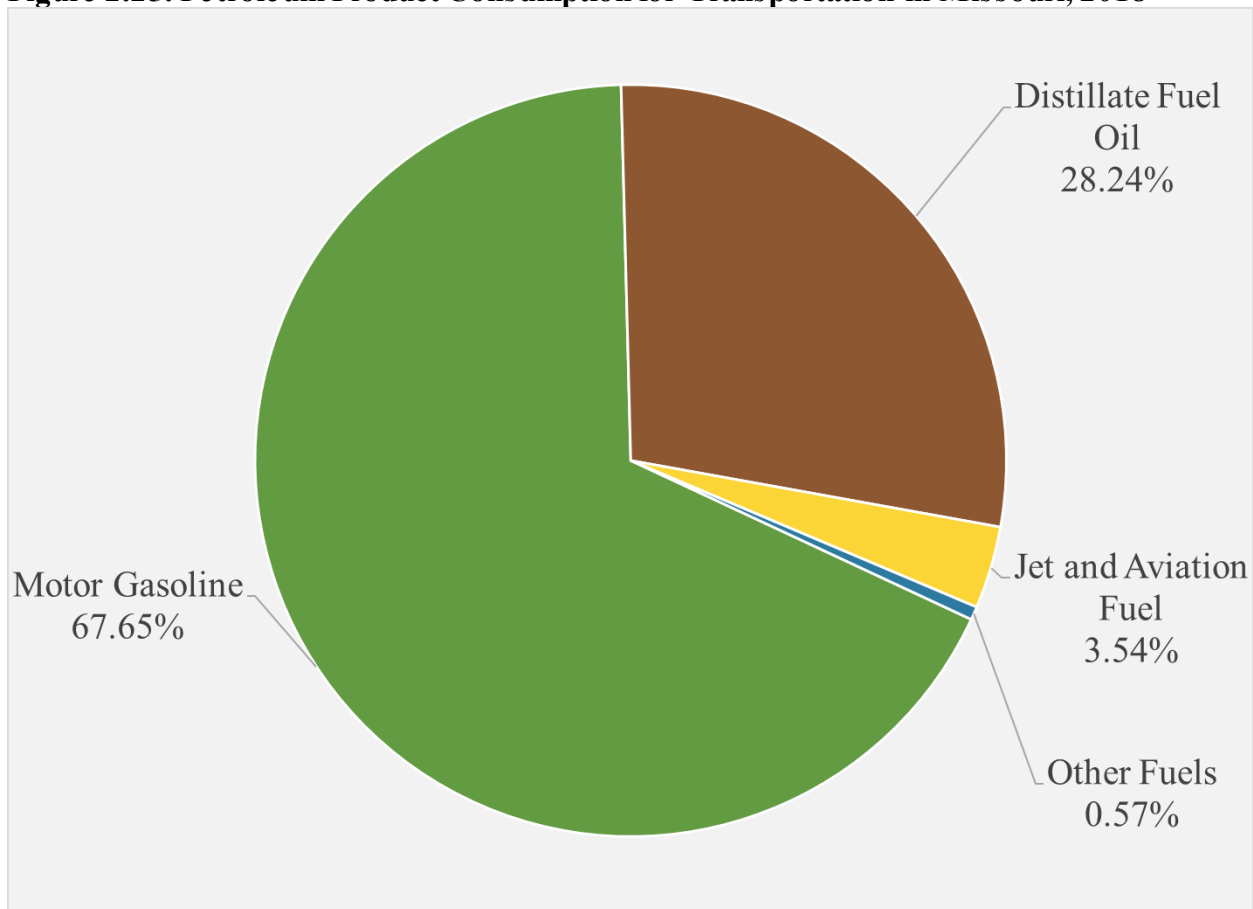


Source: U.S. Energy Information Administration. 2020. "[Natural Gas Prices](#)." Natural Gas.

d. Transportation Sector

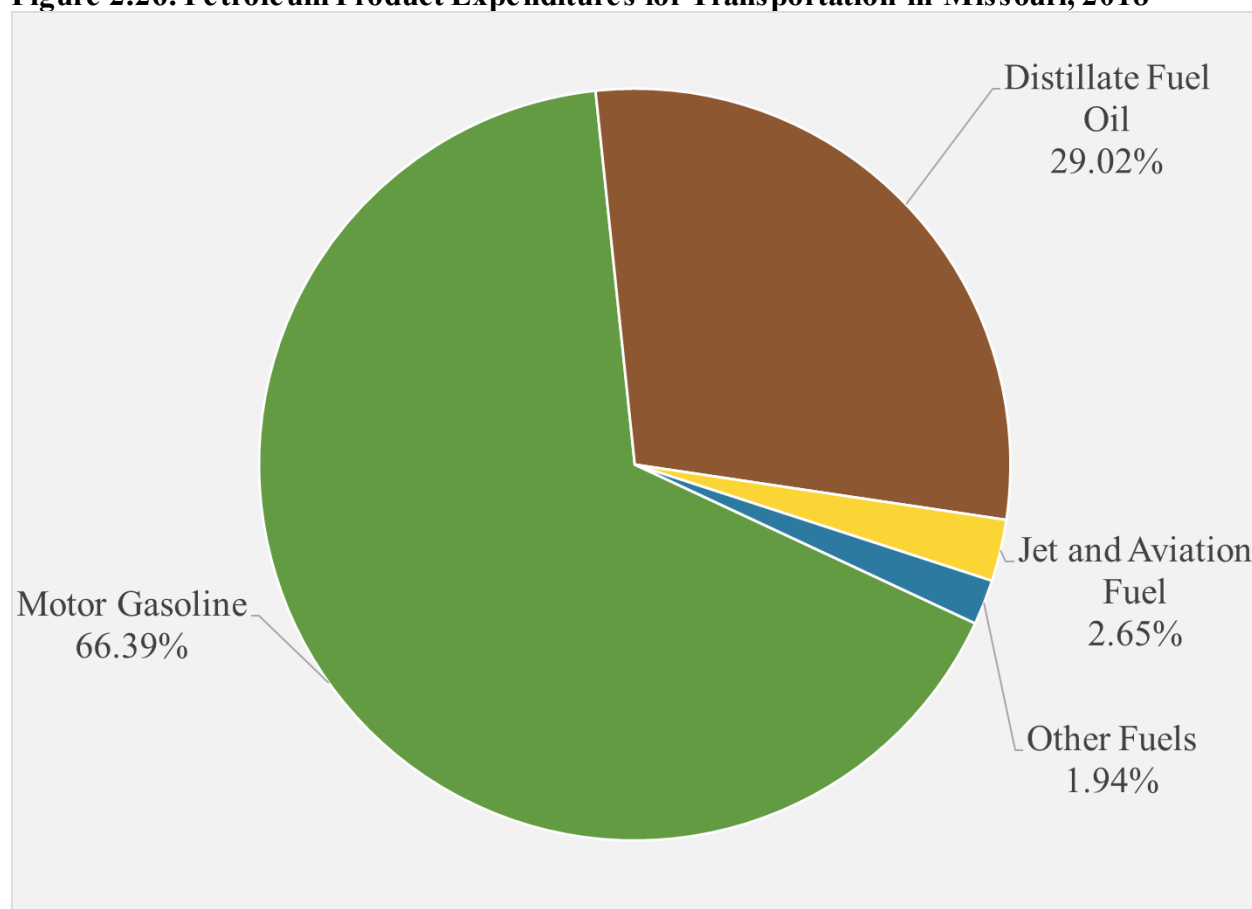
There were 544.9 trillion Btu of petroleum products consumed in the transportation sector in Missouri in 2018. Figure 2.25 shows that motor gasoline constituted 67.65% of this consumption, followed by distillate fuel oil at 28.24%.⁴⁵ Expenditures on these products totaled almost \$11.5 billion, with the majority spent on motor gasoline – see Figure 2.26.⁴⁶ According to EIA, 10.0 trillion Btu of natural gas and a relatively small amount of electricity for transportation purposes were consumed in Missouri that same year.⁴⁷

Figure 2.25. Petroleum Product Consumption for Transportation in Missouri, 2018



Source: U.S. Energy Information Administration. 2020. "[Table CT7. Transportation Sector Energy Consumption Estimates, 1960-2018, Missouri.](#)" State Energy Data System.

Figure 2.26. Petroleum Product Expenditures for Transportation in Missouri, 2018

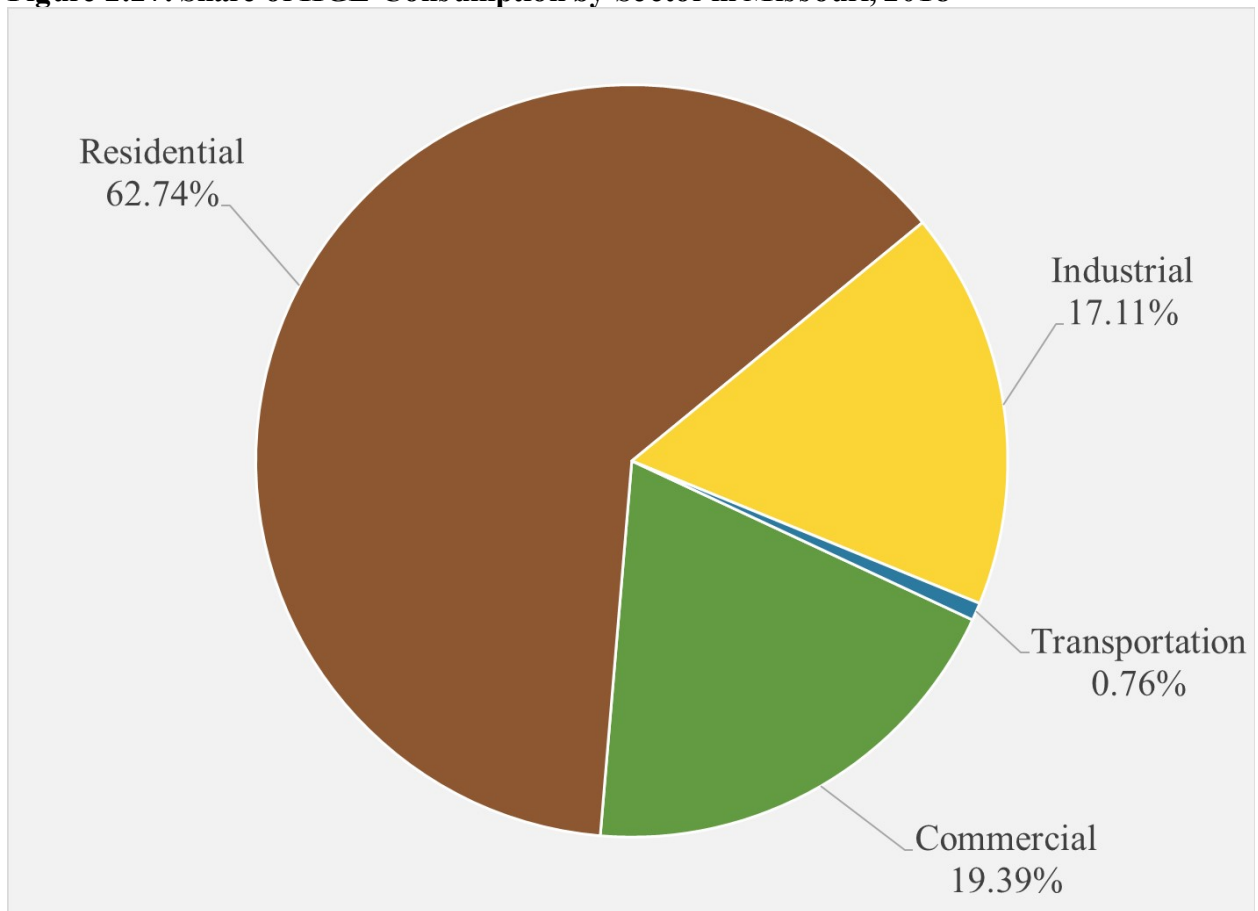


Source: U.S. Energy Information Administration. 2020. "[Table E13. Transportation Sector Energy Expenditure Estimates, 2018.](#)" State Energy Data System.

e. Propane and Hydrocarbon Gas Liquids

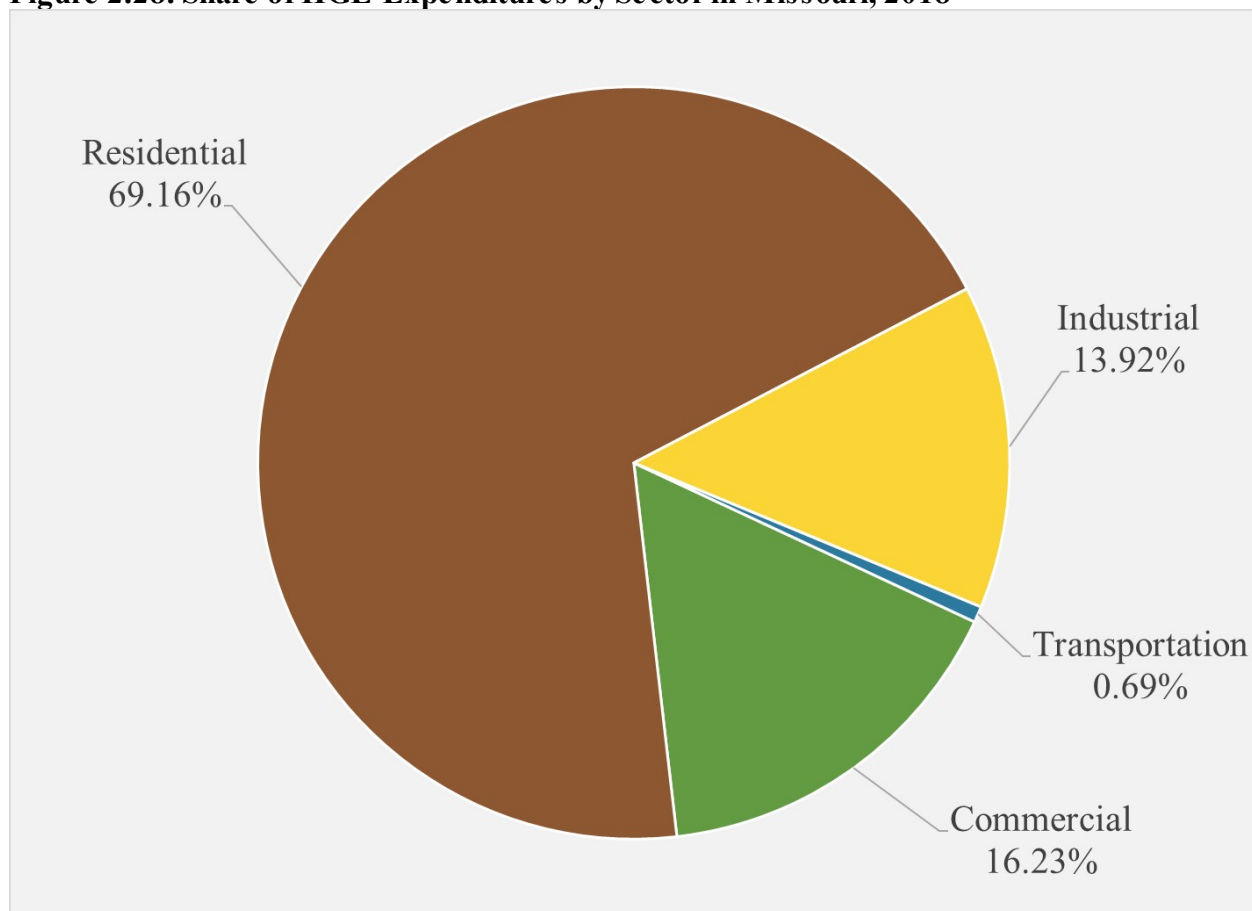
EIA defines hydrocarbon gas liquids (HGL) as, "ethane, propane, normal butane, isobutane, and natural gasoline, and their associated olefins, including ethylene, propylene, butylene, and isobutylene," but as excluding liquefied natural gas.⁴⁸ Due to the extensive use of propane in Missouri as a home heating fuel, HGL consumption and expenditures are included below. Figure 2.27 shows the share of HGL consumption by sector in Missouri for 2018 per EIA, while Figure 2.28 shows the share of HGL expenditures by sector in Missouri for 2018. Overall, 26.3 trillion Btu of HGL were consumed in Missouri (of which 62.74% was consumed in the residential sector)⁴⁹ and \$451.1 million was spent on the energy source (of which 69.16% was spent in the residential sector).⁵⁰

Figure 2.27. Share of HGL Consumption by Sector in Missouri, 2018



Source: U.S. Energy Information Administration. 2020. "[Table F11: Hydrocarbon Gas Liquids Consumption Estimates, 2018](#)." State Energy Data System.

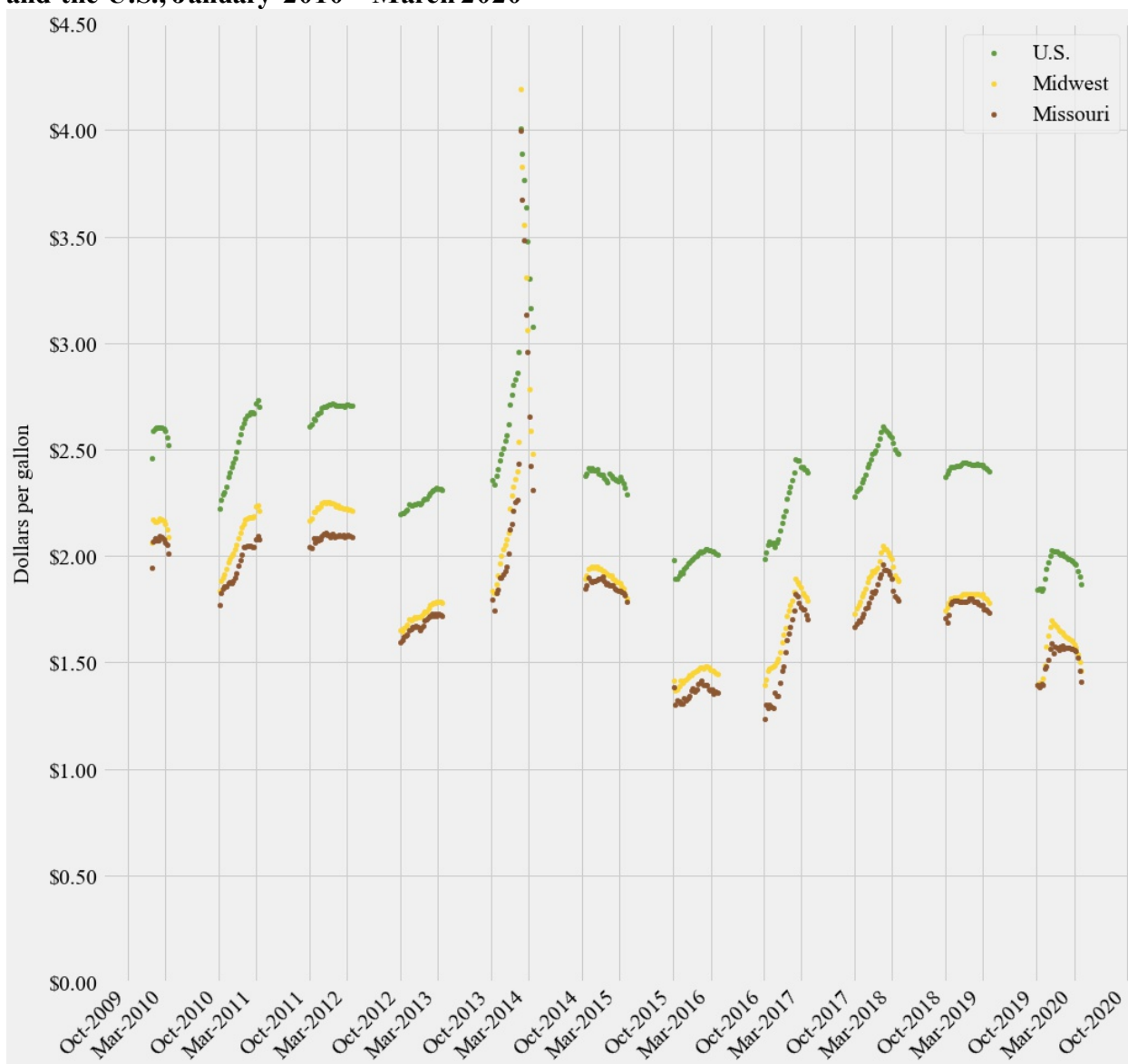
Figure 2.28. Share of HGL Expenditures by Sector in Missouri, 2018



Source: U.S. Energy Information Administration. 2020. "[Table F12: Hydrocarbon Gas Liquids Price and Expenditure Estimates, 2018.](#)" State Energy Data System.

The Department participates in EIA's State Heating Oil and Propane Program, through which residential propane prices are reported on a weekly basis during the heating season (October through March). Figure 2.29 compares weekly heating season residential propane prices in Missouri, Petroleum Administration for Defense District 2 (i.e., the Midwest) and the U.S. As seen in the figure, Missouri's residential propane prices track changes in Midwest and U.S. propane prices, with U.S. propane prices tending to be higher.⁵¹

Figure 2.29. Weekly Heating Season Residential Propane Prices in Missouri, the Midwest and the U.S., January 2010 – March 2020



Source: U.S. Energy Information Administration. 2020. “[Residential Propane Weekly Heating Oil and Propane Prices \(October - March\)](#).” Petroleum & Other Liquids.

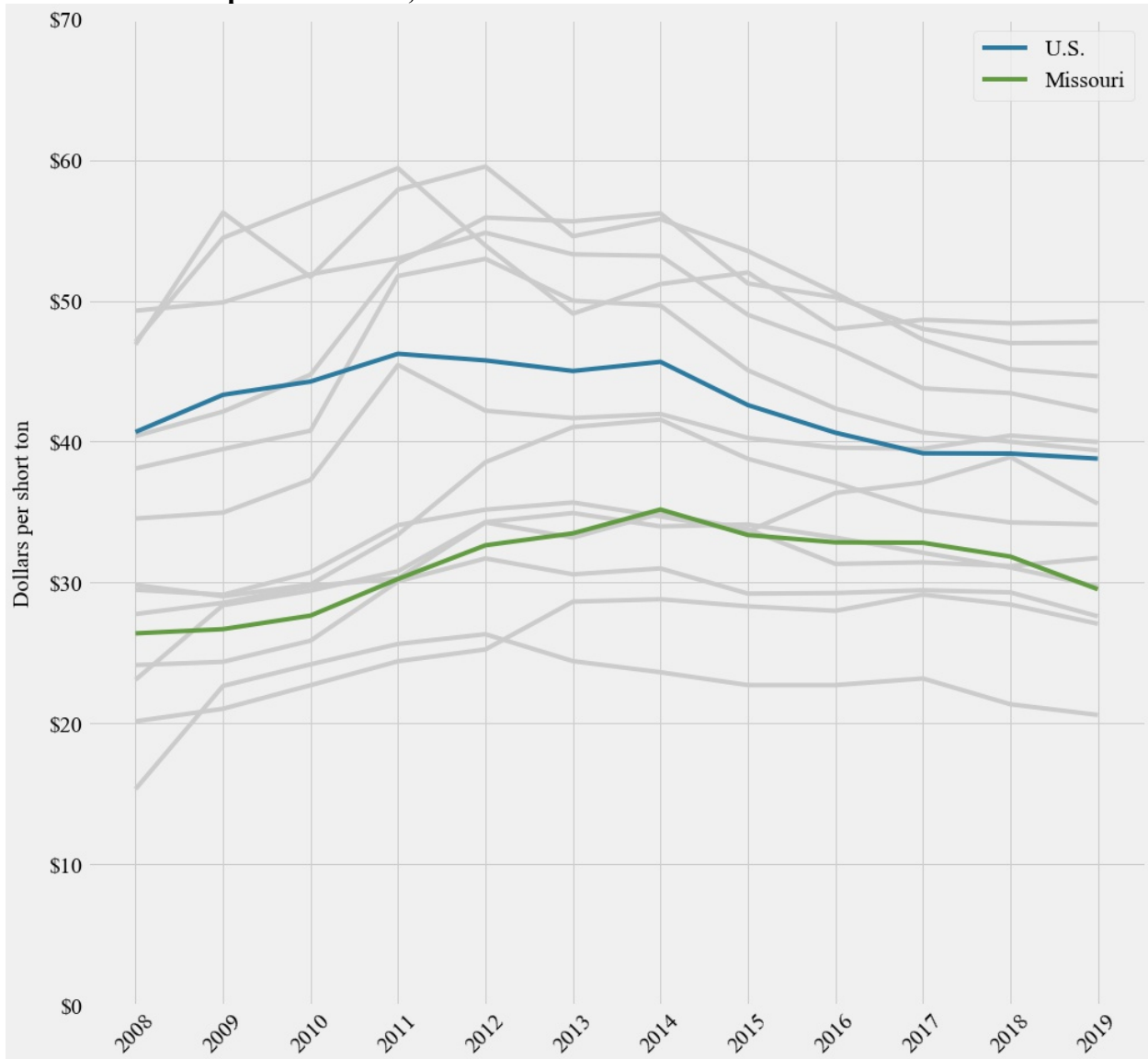
f. Coal

Most of the coal consumption reported by EIA for Missouri in 2019 was in the electric utility sector (approximately 32.8 million short tons). The commercial and institutional sector consumed about 9,017 short tons, while the “other industrial”⁵² sector consumed approximately 821,937 short tons.⁵³

Figure 2.30 shows the price of coal shipments to the electric power sector for plants in Missouri, the U.S., and the comparison states for the 2008 to 2019 time period. Figure 2.31 shows the price of coal shipments for the other industrial sector, excluding Arkansas and Kansas (for which data

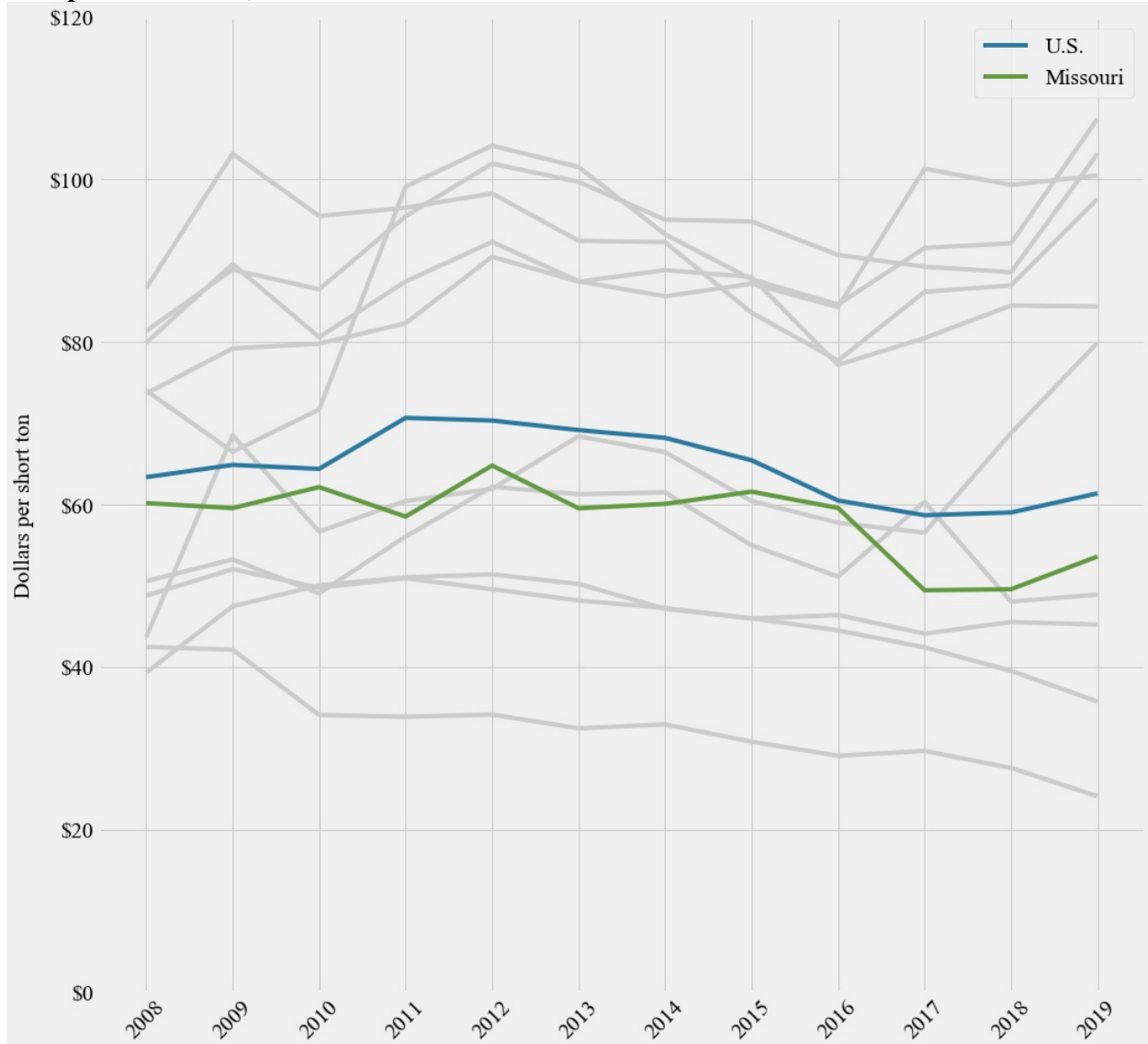
were withheld) as well as Tennessee (for which data were only available from 2016 to 2018 during the time period, with the other years withheld).

Figure 2.30. Prices of Coal Shipments to the Electric Power Sector by State for Missouri, the U.S. and Comparison States, 2008-2019



Source: U.S. Energy Information Administration. 2019. "[Coal shipments to the electric power sector: price, by plant state](#)," Coal Data Browser.

Figure 2.31. Prices of Coal for the Other Industrial Sector in Missouri, the U.S. and Select Comparison States, 2008-2019



Source: U.S. Energy Information Administration. 2019. "[Price \(\\$/short ton\)](#)." Coal Data Browser.

3. Energy Production

a. Electric Generation Portfolio⁵⁴

Note that the electricity generated in a particular state or area is not necessarily the same as the electricity used to serve customers of particular utilities. For example, some Missouri customers may receive electricity from a utility that also owns plants in Illinois, Kansas, or some other state. In addition, resources owned by certain entities may be used by others. For instance, an independent power producer's wind farm generation may be contracted to utilities.

Caution should be exercised when comparing data from different years because of methodology changes.⁵⁵

i. Capacity

Table 3.1 summarizes the in-state generation capacity of the utilities and other entities in Missouri in 2018. Most of the capacity was associated with investor-owned utilities, but municipal utilities were identified as having the highest number of generating units.⁵⁶ Note that "CHP" stands for "combined heat and power."

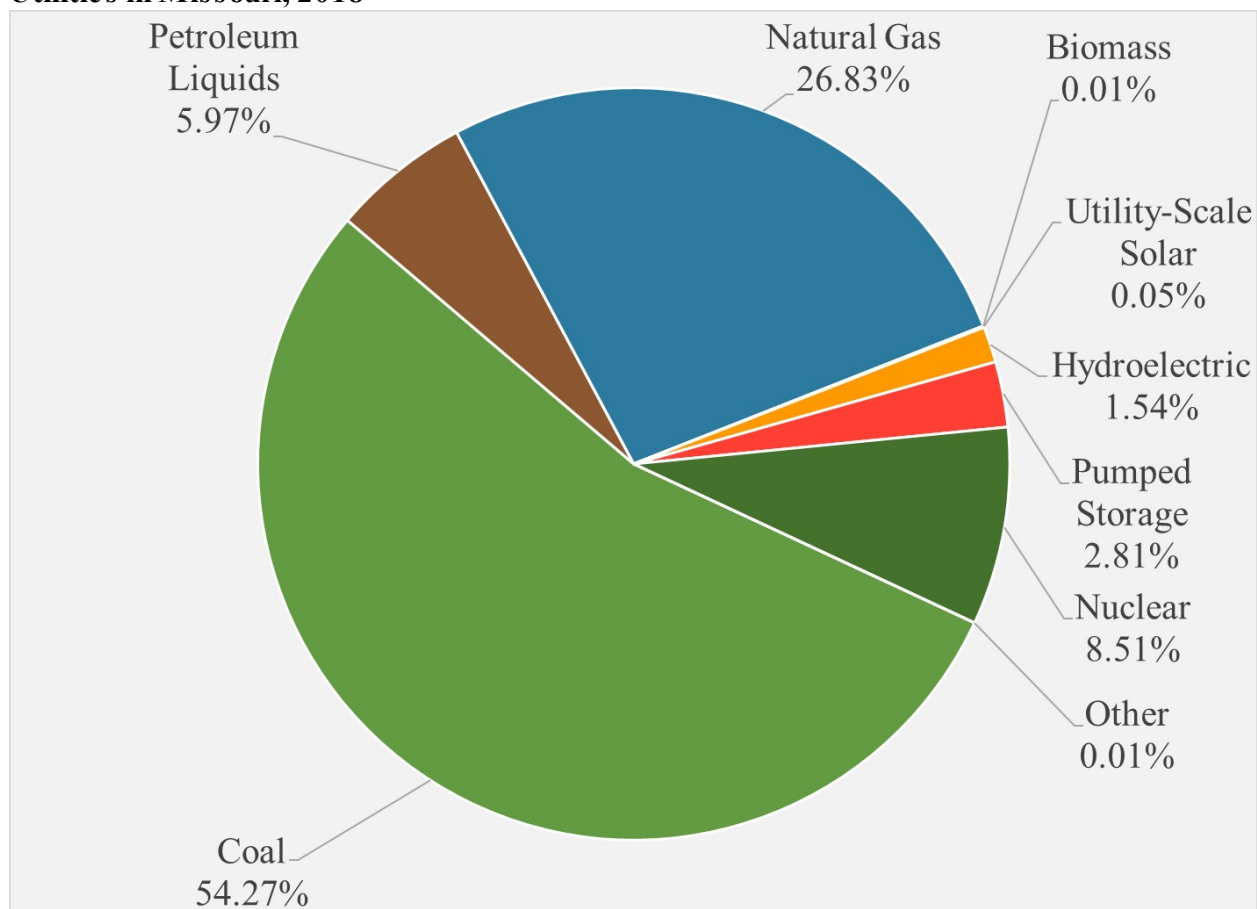
Table 3.1. In-State Generation Capacity by Utility or Entity Type in Missouri, 2018

Generator Type	Number of Generating Units	Nameplate Capacity (MW)	Percentage of Total Capacity
Investor-Owned Utilities	92	14,529	62.83%
Municipal Utilities	225	2,490	10.77%
Electric Cooperatives	17	3,803	16.44%
US Army Corps of Engineers	13	471	2.04%
Commercial	10	20	0.09%
Industrial CHP	4	31	0.13%
Independent Power Producers Non-CHP	33	1,651	7.14%
Independent Power Producers - CHP	5	37	0.16%
University of Missouri CHP Plant	10	91	0.40%
Totals	409	23,124	100.00%

Source: U.S. Energy Information Administration. 2019. "[Form EIA-860 detailed data with previous form data \(EIA-860A/860B\)](#)." Schedule 1 – Utility Data, Schedule 3 – Generator Data, and Content and Layout of the Annual Electric Generator Report (EIA-860) Data Files for 2018. Electricity.

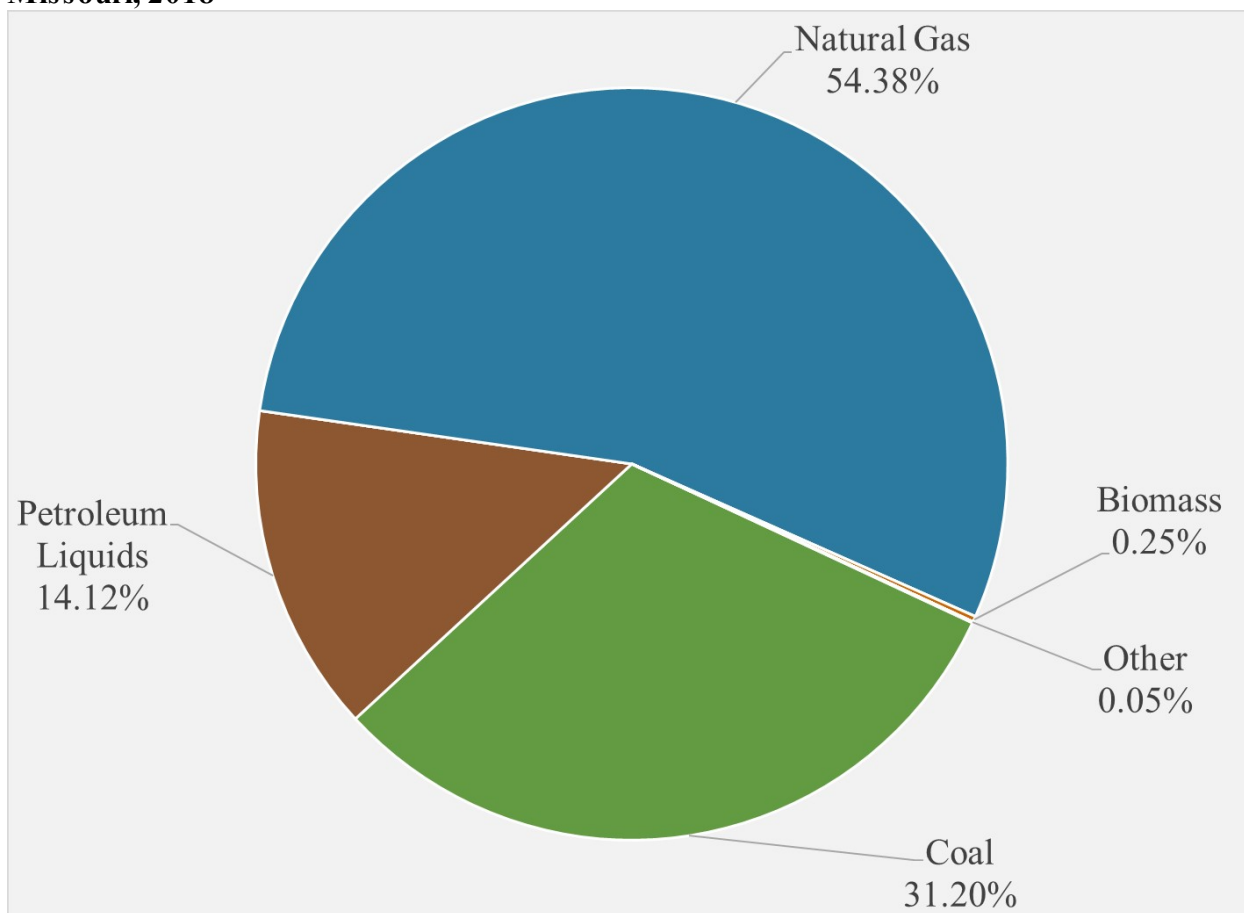
Figure 3.1, Figure 3.2, Figure 3.3 and Figure 3.4 show 2018 in-state generation capacity by fuel source for Missouri's investor-owned utilities, municipal utilities, rural electric cooperative utilities and independent power producers, respectively. Coal and natural gas were the predominant fuel sources in the collective in-state portfolios of the investor-owned utilities, municipal utilities and rural electric cooperative utilities. Nuclear and hydroelectric power also comprised substantial portions of the investor-owned utilities' collective portfolio. Much of the independent power producers' combined portfolio consisted of wind and natural gas.⁵⁷

Figure 3.1. Share of In-State Generation Capacity by Fuel Source for Investor-Owned Utilities in Missouri, 2018



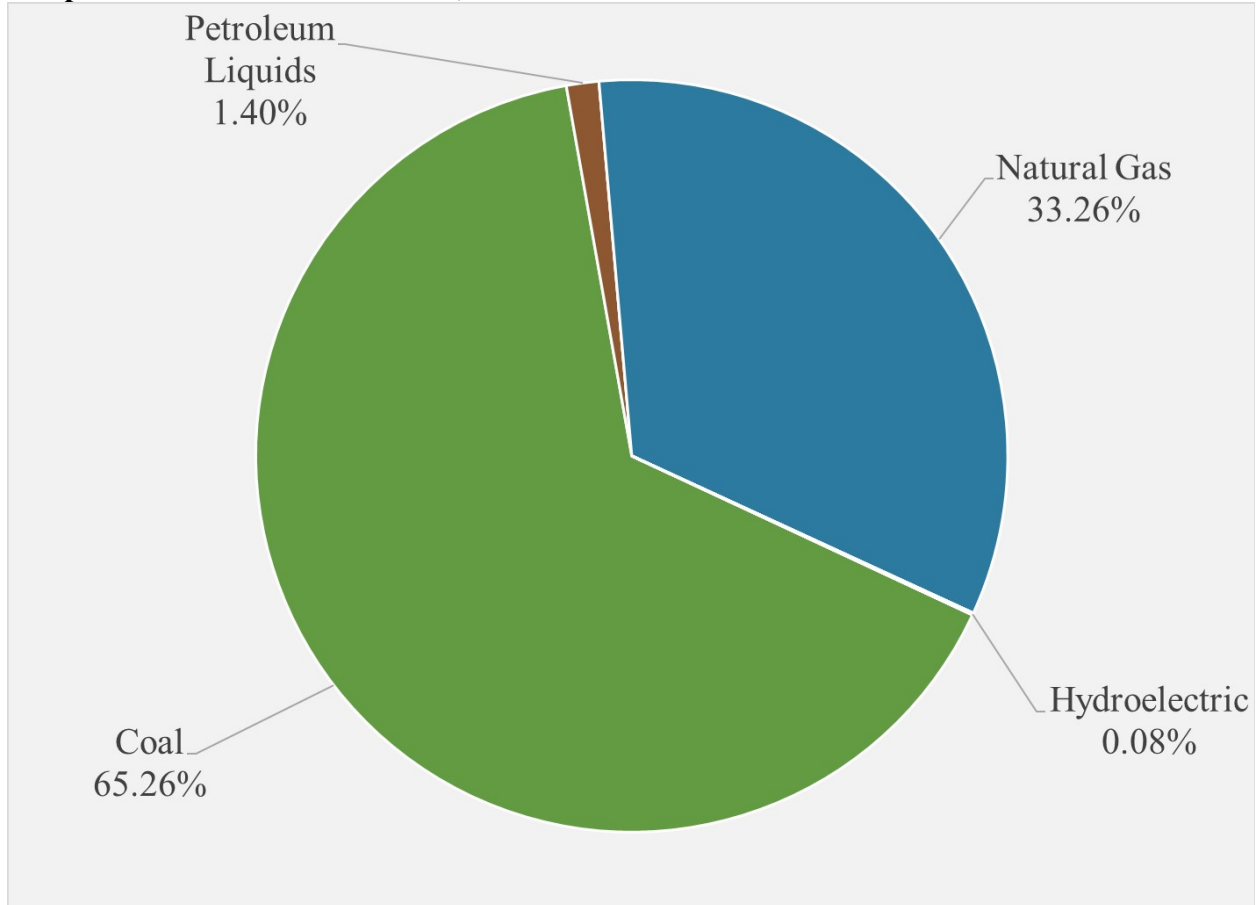
Source: U.S. Energy Information Administration. 2019. "[Form EIA-860 detailed data with previous form data \(EIA-860A/860B\)](#)." Schedule 1 – Utility Data, Schedule 3 – Generator Data, and Content and Layout of the Annual Electric Generator Report (EIA-860) Data Files for 2018. Electricity.

Figure 3.2. Share of In-State Generation Capacity by Fuel Source for Municipal Utilities in Missouri, 2018



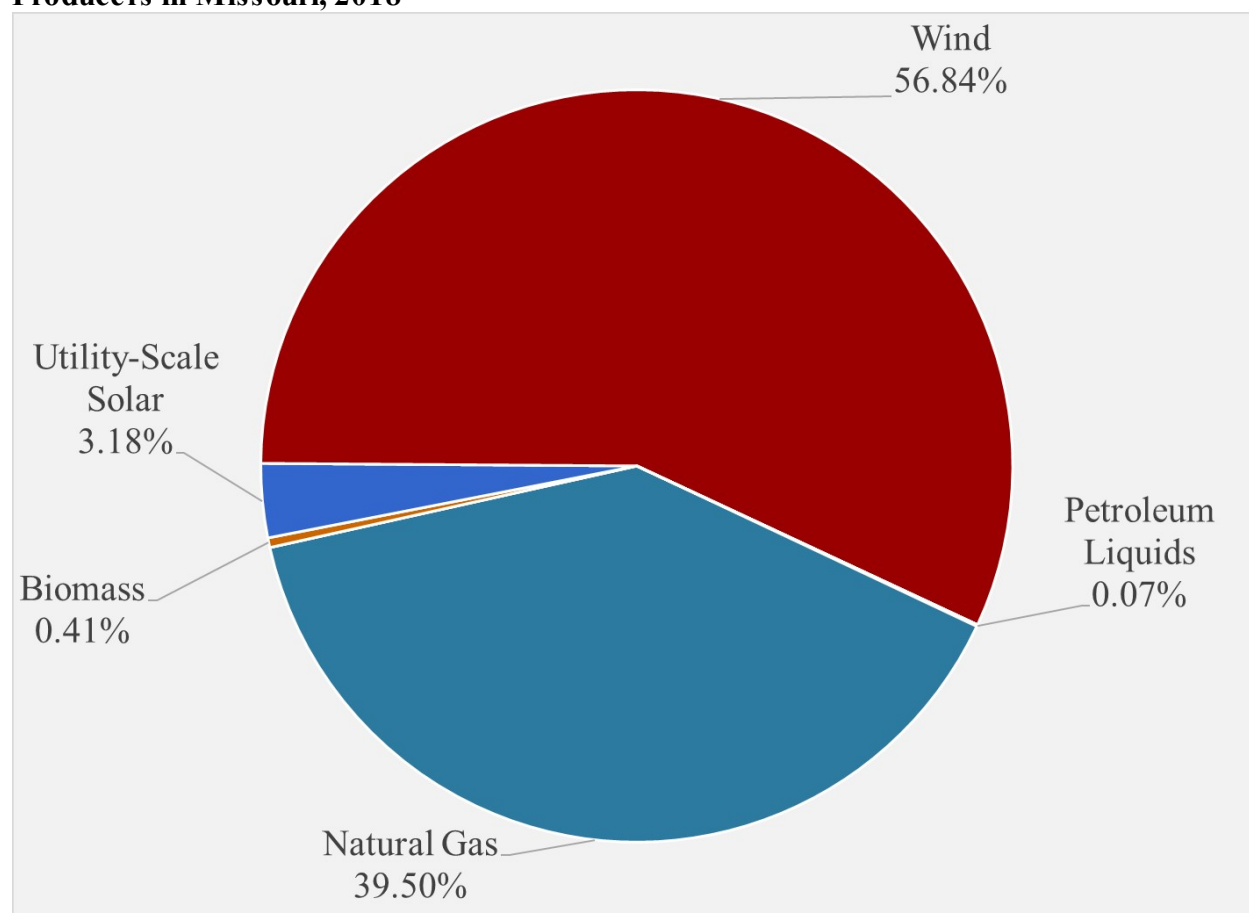
Source: U.S. Energy Information Administration. 2019. "[Form EIA-860 detailed data with previous form data \(EIA-860A/860B\)](#)." Schedule 1 – Utility Data, Schedule 3 – Generator Data, and Content and Layout of the Annual Electric Generator Report (EIA-860) Data Files for 2018. Electricity.

Figure 3.3. Share of In-State Generation Capacity by Fuel Source for Rural Electric Cooperative Utilities in Missouri, 2018



Source: U.S. Energy Information Administration. 2019. "[Form EIA-860 detailed data with previous form data \(EIA-860A/860B\)](#)." Schedule 1 – Utility Data, Schedule 3 – Generator Data, and Content and Layout of the Annual Electric Generator Report (EIA-860) Data Files for 2018. Electricity.

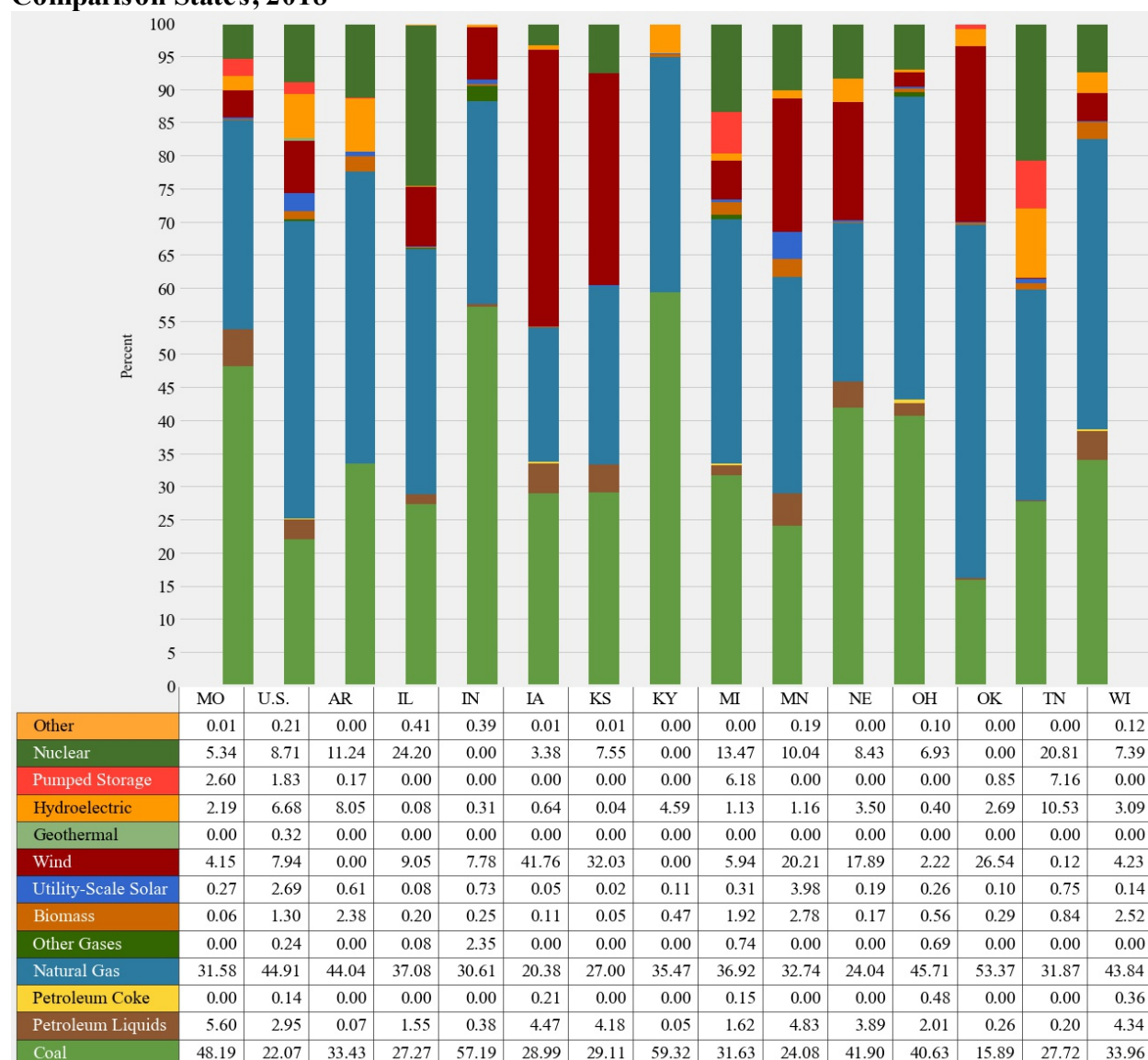
Figure 3.4. Share of In-State Generation Capacity by Fuel Source for Independent Power Producers in Missouri, 2018



Source: U.S. Energy Information Administration. 2019. "[Form EIA-860 detailed data with previous form data \(EIA-860A/860B\)](#)." Schedule 1 – Utility Data, Schedule 3 – Generator Data, and Content and Layout of the Annual Electric Generator Report (EIA-860) Data Files for 2018. Electricity.

Figure 3.5 compares the percentage shares of total in-state capacity by fuel source for Missouri, the U.S., surrounding states and Indiana, Michigan, Minnesota, Ohio and Wisconsin in 2018. Of the comparison states, Missouri had the third-largest share of coal-fired capacity relative to total in-state capacity, behind Indiana and Kentucky. In addition, Missouri had the third-largest total in-state share of pumped storage capacity, behind Tennessee and Michigan.⁵⁸

Figure 3.5. Share of In-State Generation Capacity by Fuel Source in Missouri, the U.S. and Comparison States, 2018

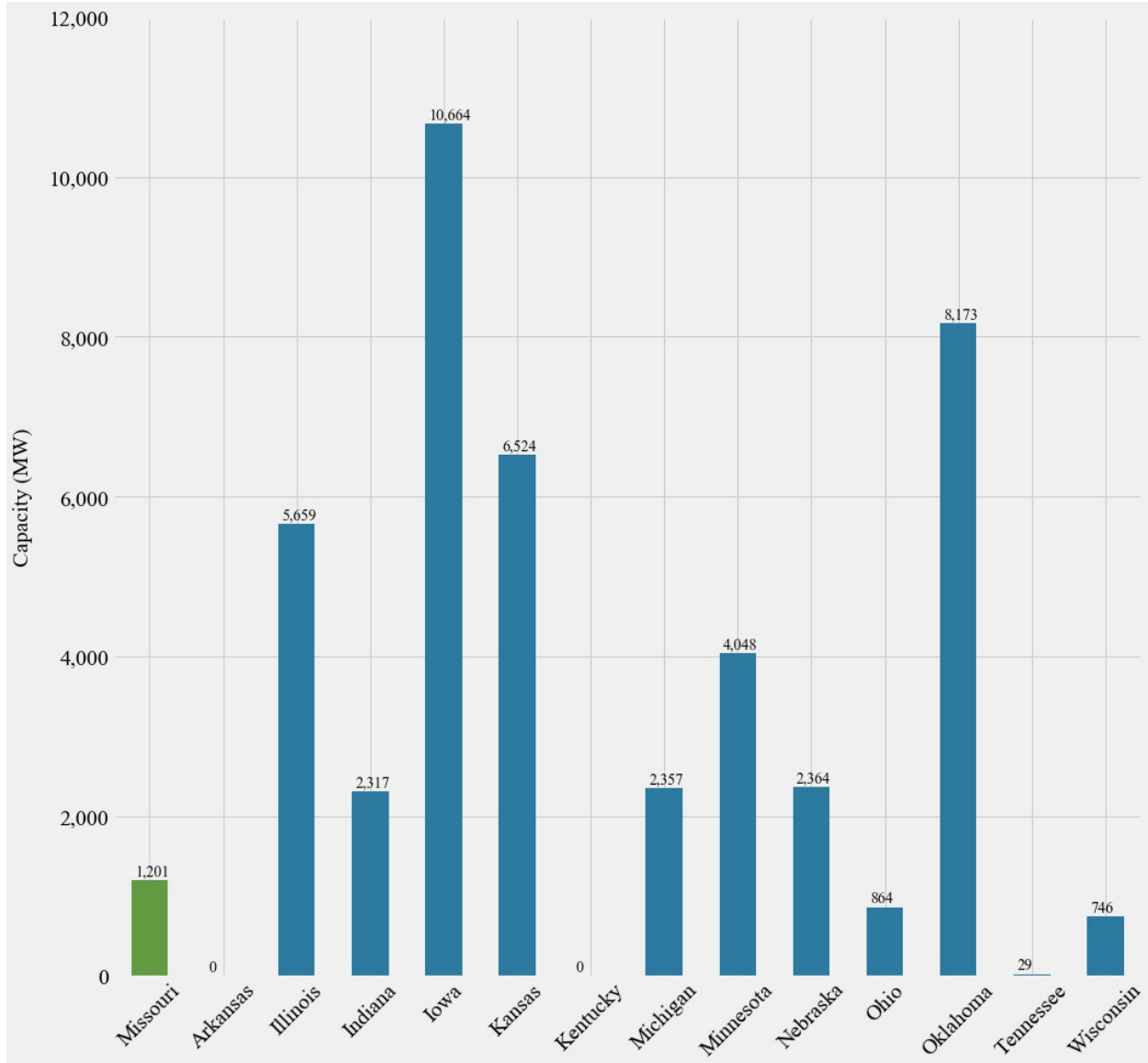


Values in table are percentages.

Source: U.S. Energy Information Administration. 2019. "[Form EIA-860 detailed data with previous form data \(EIA-860A/860B\)](#)." Schedule 1 – Utility Data, Schedule 3 – Generator Data, and Content and Layout of the Annual Electric Generator Report (EIA-860) Data Files for 2018. Electricity.

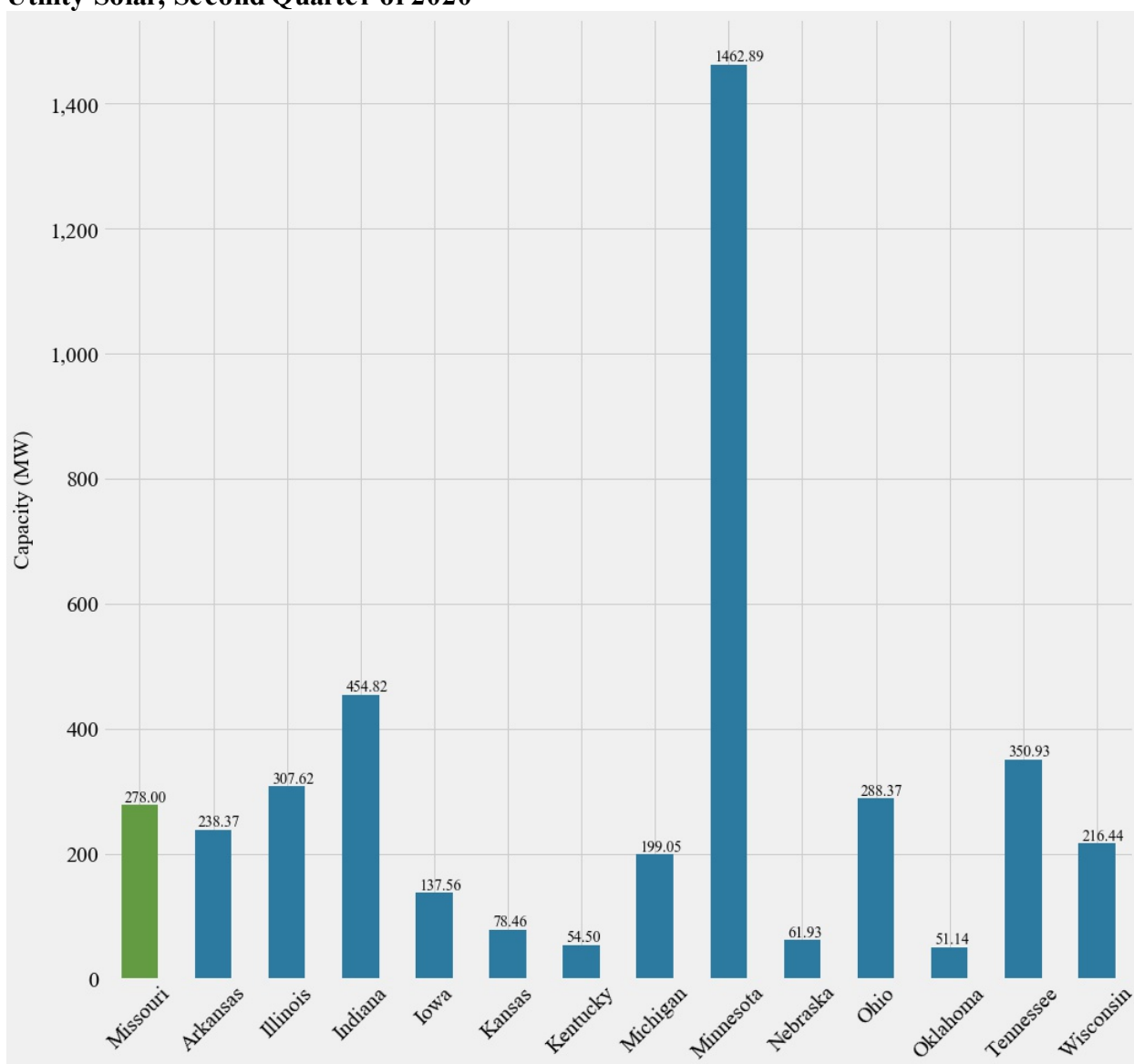
Based on industry data, Missouri ranks ninth for installed wind capacity⁵⁹ and sixth for installed solar capacity (including non-utility solar)⁶⁰ among the comparison states.

Figure 3.6. Installed Wind Capacity in Missouri and Comparison States, First Quarter of 2020



Source: American Wind Energy Association. 2020. "[State Facts Sheets](#)." Resources – Fact Sheets.

Figure 3.7. Installed Solar Capacity in Missouri and Comparison States, Including Non-Utility Solar, Second Quarter of 2020

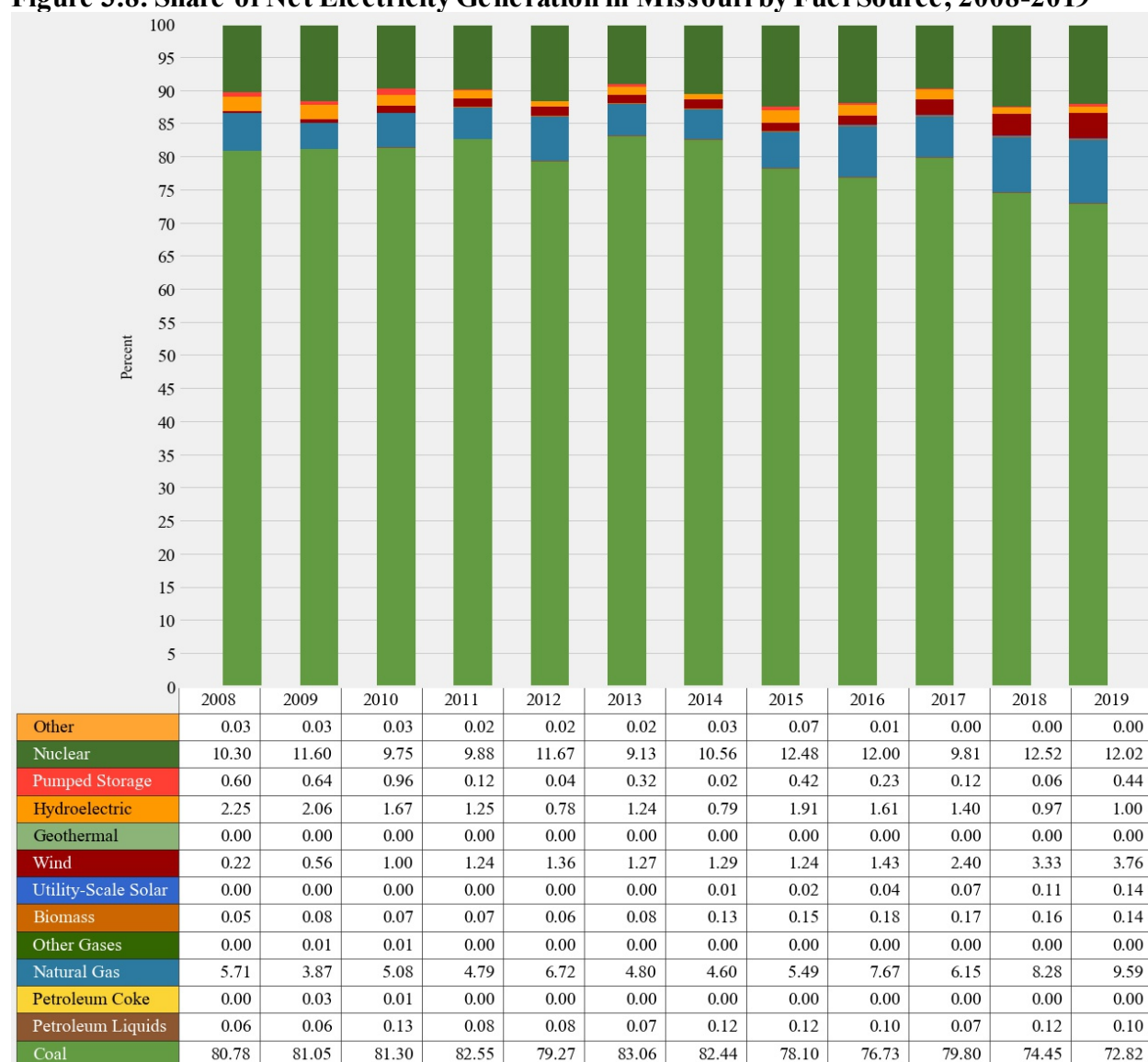


Source: Solar Energy Industries Association. 2020. "[Solar State by State](#)."

ii. Generation

Coal remains the predominant fuel source used for electricity generation in Missouri, as shown in Figure 3.8. Generation from coal peaked between 2008 and 2019 on an absolute basis in 2011 at 78,316 gigawatt-hours (GWh)⁶¹ and was down to 55,686 GWh by 2019. On a relative basis, coal's share of Missouri's electricity portfolio between 2008 and 2019 was largest in 2013 at 83.06%. In 2019, the share of coal-fired electricity was 72.82%. The shares of electricity produced from natural gas and wind were 9.59% and 3.76% in 2019, respectively. Nuclear energy supplied 12.02% of the state's net generation in 2019.⁶² Figure 3.8 displays these percentage shares.

Figure 3.8. Share of Net Electricity Generation in Missouri by Fuel Source, 2008-2019

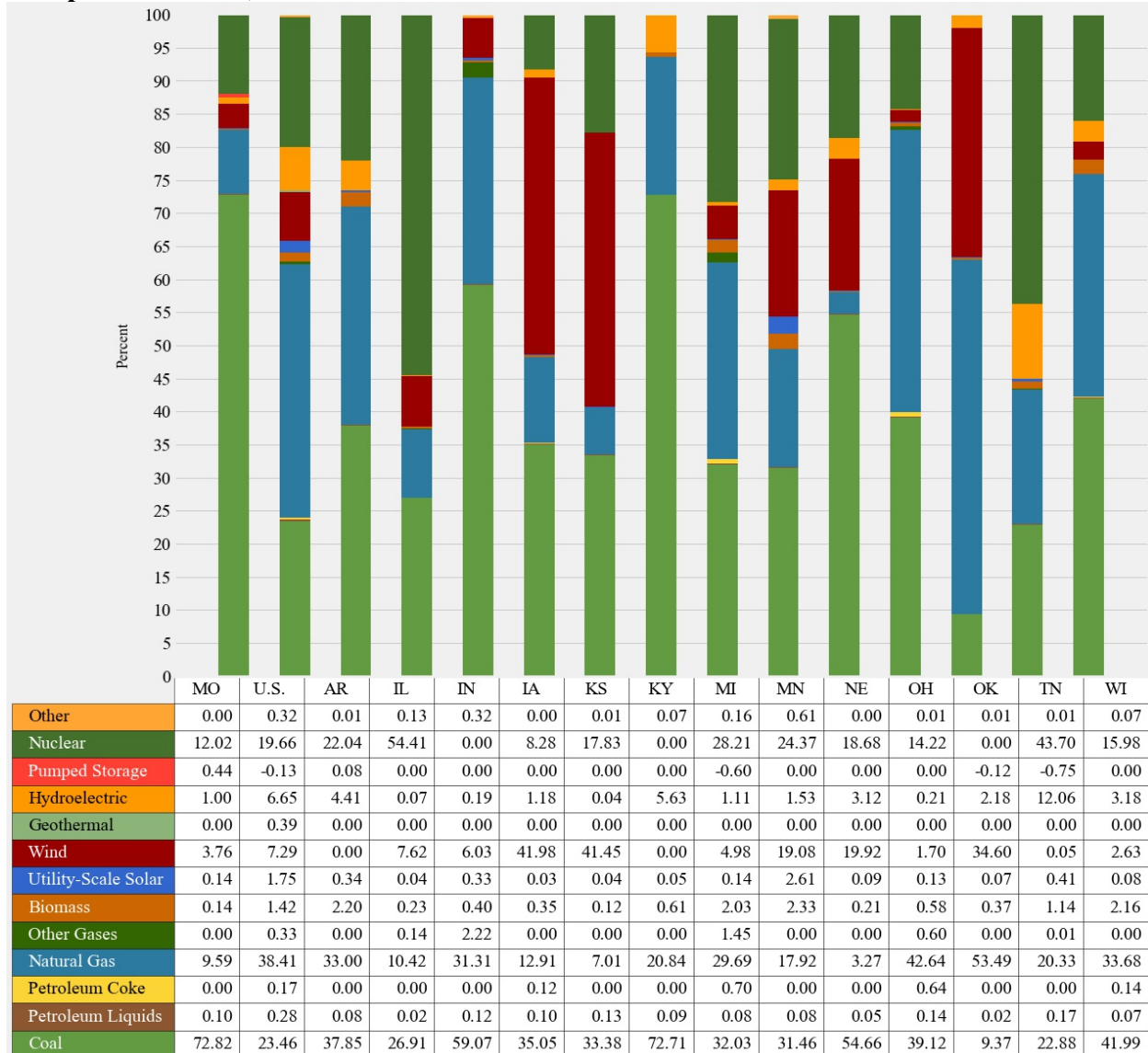


Values in table are percentages.

Source: U.S. Energy Information Administration. 2020. "[Net generation for all sectors](#)." Electricity Data Browser.

Compared to surrounding states, as well as Indiana, Ohio, Michigan, Minnesota and Wisconsin, Missouri's share of electricity generated from coal in 2019 was most similar to Kentucky's generation on a percentage basis (72.71% in Kentucky versus 72.82% for Missouri). Illinois and Tennessee relied on nuclear power for substantial portions of their states' electricity production (54.41% and 43.70%, respectively), while significant amounts of electricity were produced from wind in Iowa, Kansas and Oklahoma (41.98%, 41.45% and 34.60%, respectively). Natural gas comprised substantial shares of generation in several of the comparison states, with 53.49% of net generation in Oklahoma coming from that fuel. See Figure 3.9, which presents these percentages.⁶³

Figure 3.9. Share of Net Electricity Generation by Fuel Source in Missouri, the U.S. and Comparison States, 2019

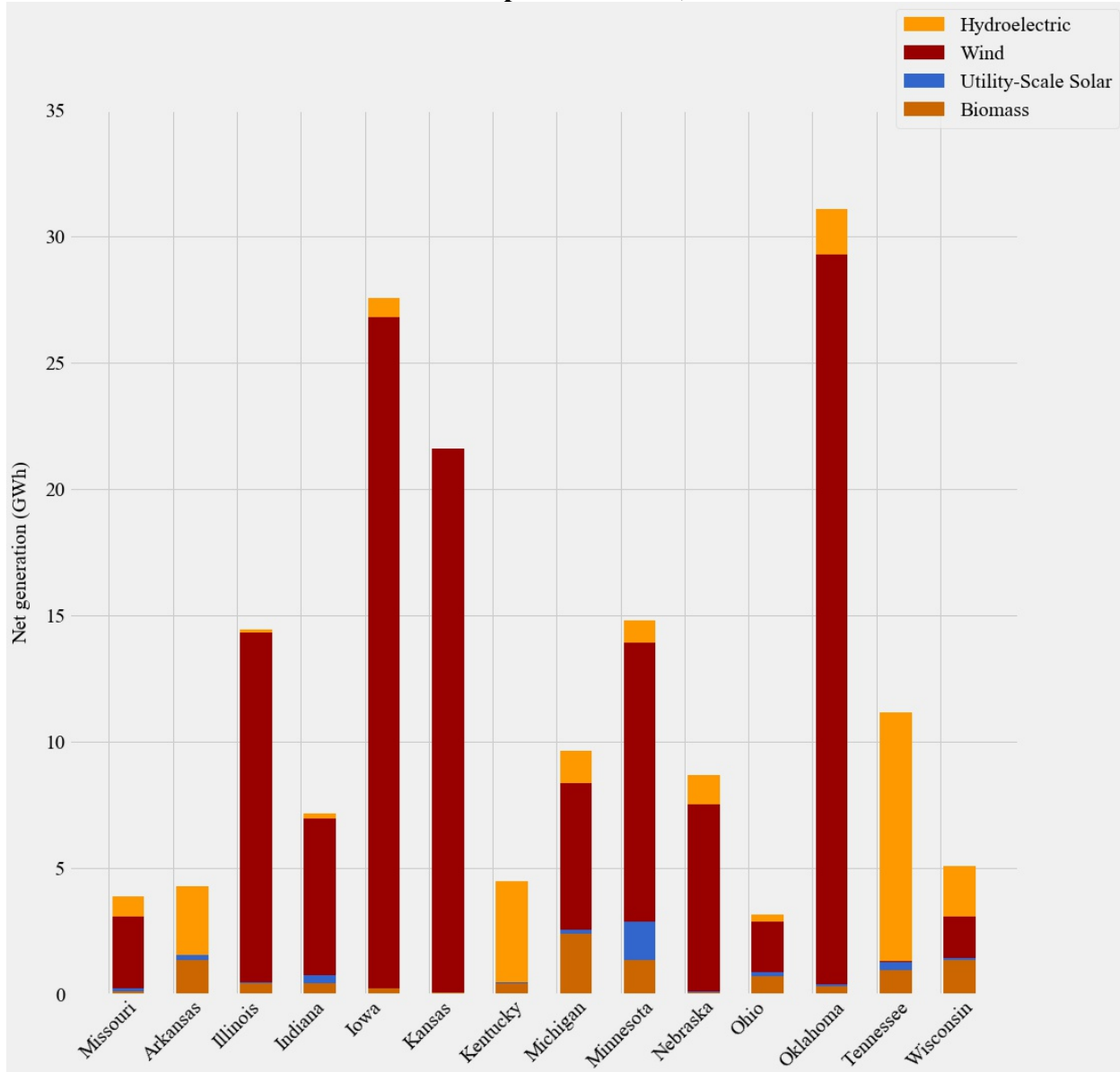


Values in table are percentages.

Source: U.S. Energy Information Administration. 2020. "[Net generation for all sectors](#)." Electricity Data Browser. Note that EIA data on utility-scale solar for Indiana in 2012 are interpreted to equal zero in this document because of EIA's designation of such data as, "Not meaningful due to large relative standard error."

With respect to the comparison states, Missouri ranked ninth for total net generation from hydroelectricity in 2019, as well as seventh for utility-scale solar, ninth for wind and twelfth for biomass total net generation in that year. Of the comparison states, Oklahoma had the highest total net generation from these four renewables combined that year, as well as the highest total net generation from wind.⁶⁴

Figure 3.10. Total Net Electricity Generation From Hydroelectric, Utility-Scale Solar, Wind and Biomass in Missouri and Comparison States, 2019

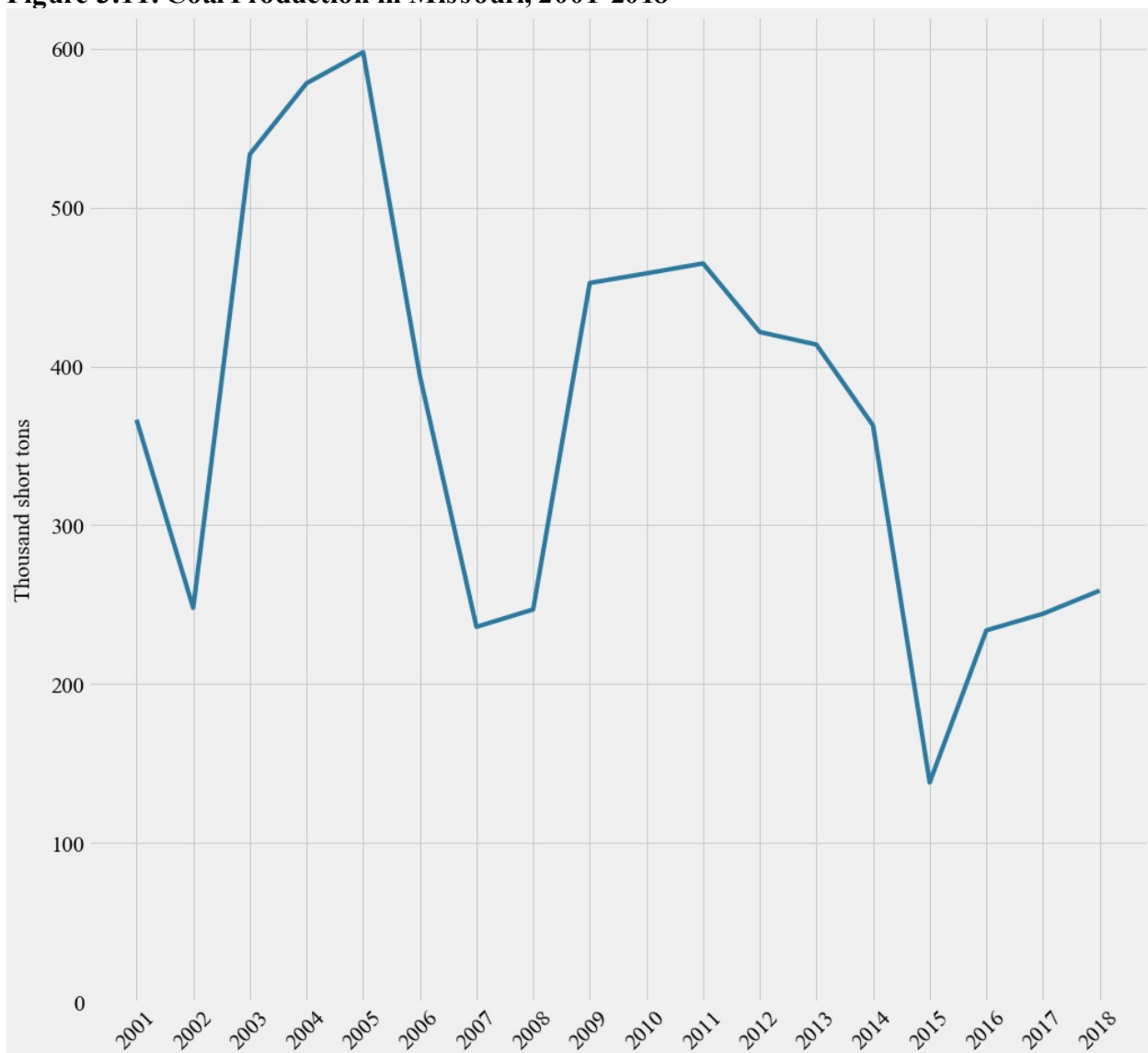


Source: U.S. Energy Information Administration. 2020. "[Net generation for all sectors](#)." Electricity Data Browser.

b. Coal, Oil, and Gas

In 2019, Missouri produced 189,000 short tons of coal, decreasing 26.9% from 2018.⁶⁵ During the 2001-2018 time period, coal production in Missouri was highest in 2005 and 2011. All of the production listed by EIA for 2018 occurred at the Foster South surface mine in Bates County.⁶⁶ Approximately 128,100 short tons of coal were shipped from this mine to the La Cygne power plant in Kansas in 2019, primarily by train.^{67, 68} EIA also indicates that 69,000 short tons of coal were shipped from Missouri by truck to industrial plants in Kansas in 2018.⁶⁹

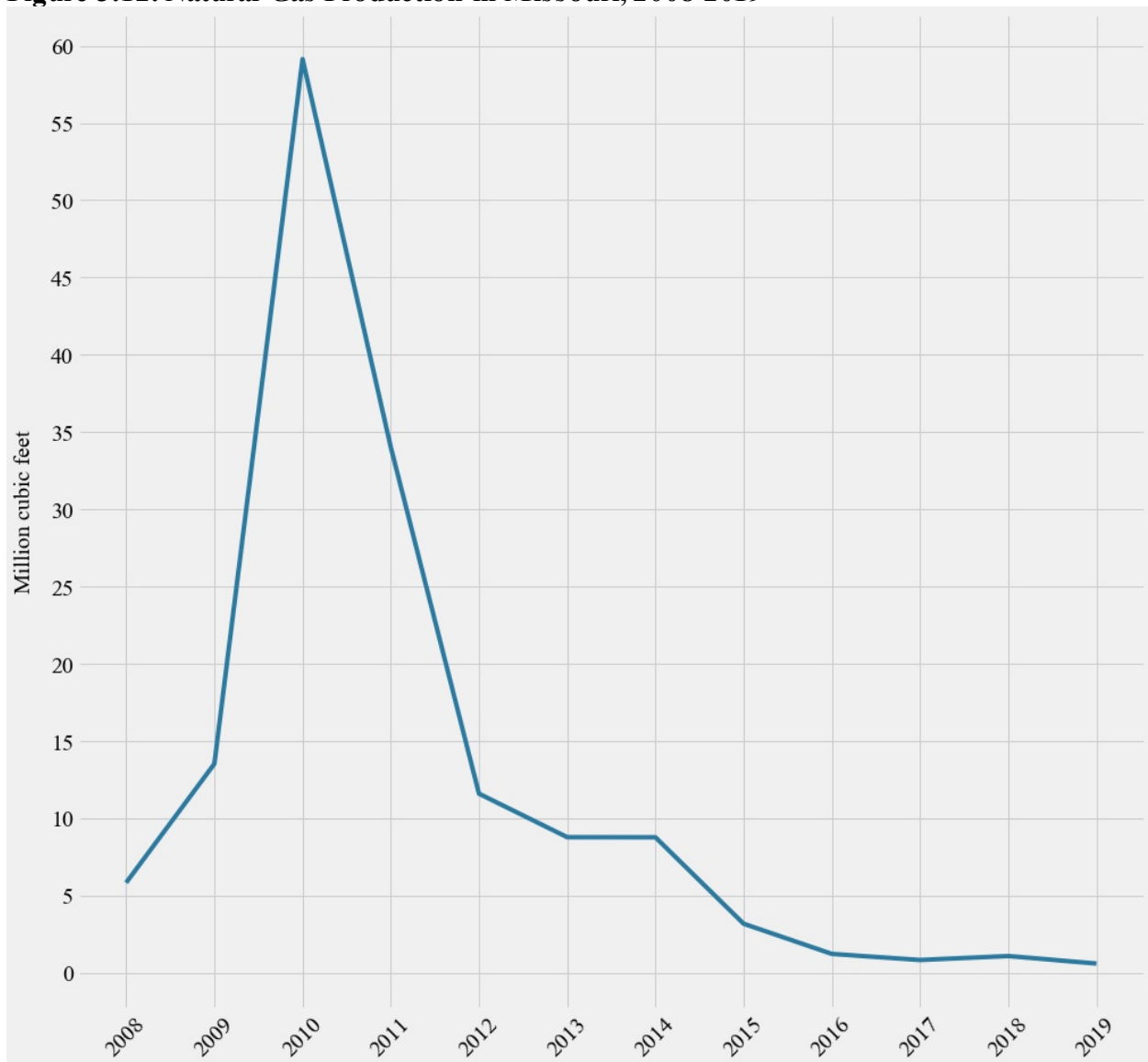
Figure 3.11. Coal Production in Missouri, 2001-2018



Source: U.S. Energy Information Administration. 2019. "[Aggregate coal mine production for total](#)." Coal Data Browser.

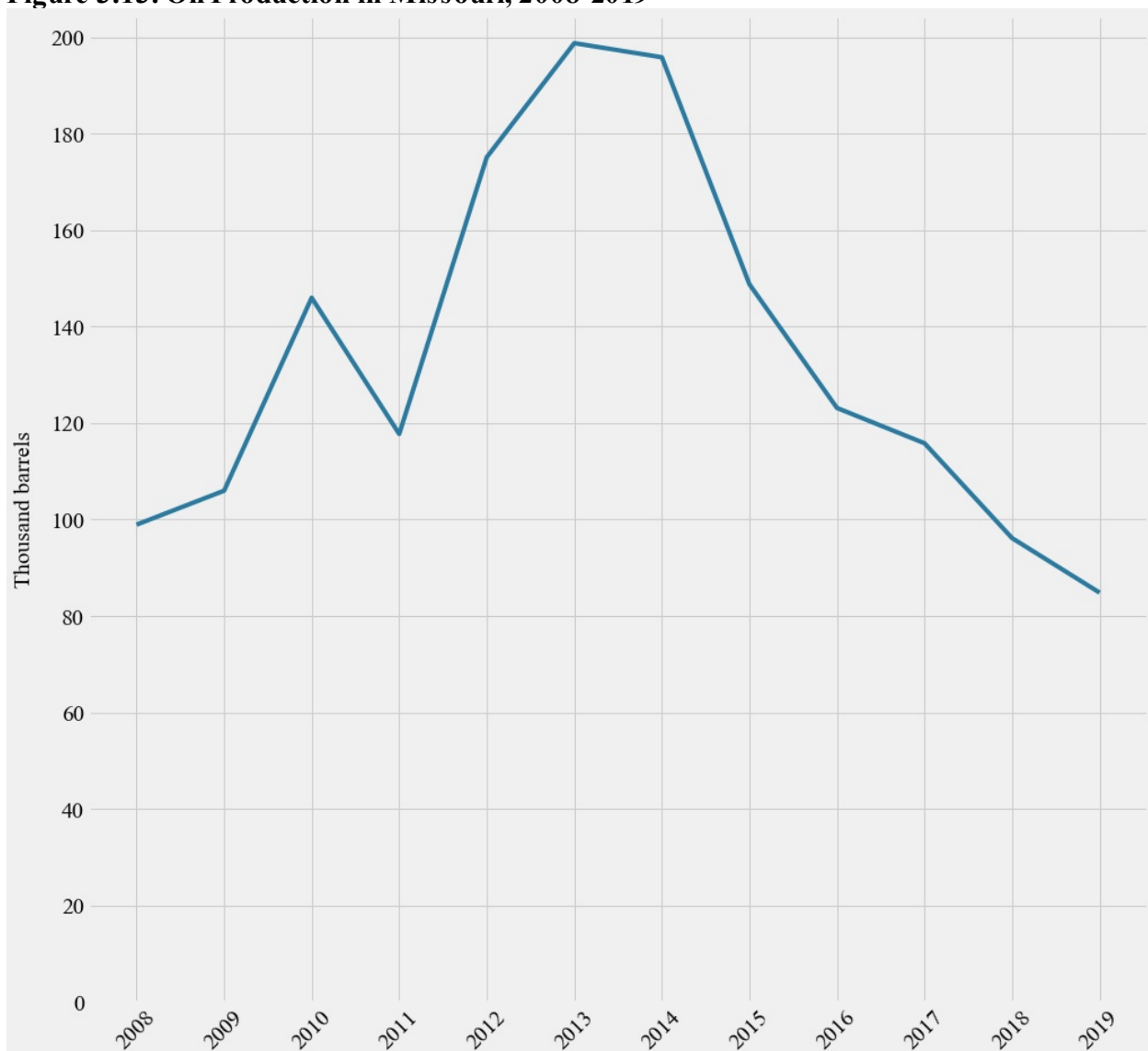
According to the Missouri Geological Survey, 596,000 cubic feet of natural gas were produced in the state in 2019. This compares to 59.1 million cubic feet of production in 2010. The Missouri Geological Survey also indicates over 84,830 barrels of oil were produced in five counties in 2019, with a value of approximately \$4.1 million. Most of this oil was produced in Cass County; the other four counties with oil production were St. Louis, Atchison, Vernon and Jackson. In 2013, production stood at over 198,734 barrels.⁷⁰

Figure 3.12. Natural Gas Production in Missouri, 2008-2019



Source: Missouri Department of Natural Resources, Missouri Geological Survey, Geological Survey Program. 2020. Email communication. May 14.

Figure 3.13. Oil Production in Missouri, 2008-2019

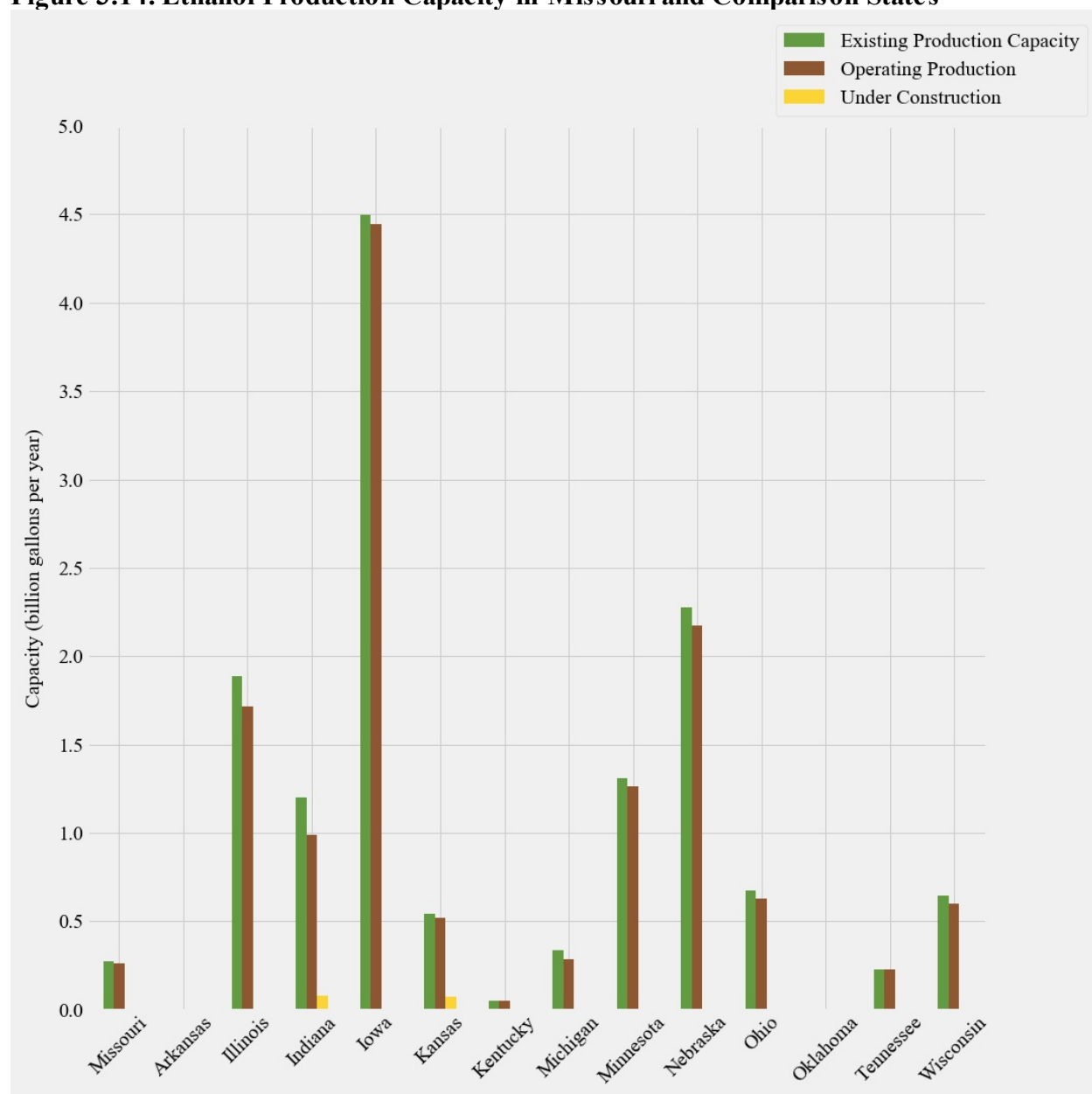


Source: Missouri Department of Natural Resources, Missouri Geological Survey, Geological Survey Program. 2020. Email communication. May 14.

c. Bioenergy

Missouri ranked twelfth for the production of biomass inputs for biofuel production in 2018.⁷¹ Figure 3.14 shows ethanol production capacity for the comparison states based on data from a 2020 Renewable Fuels Association document. Missouri had low listed production capacity relative to most of the other comparison states, with 276 million gallons per year (mgy) of existing production capacity and 261 mgy of operating production. Iowa had the most existing production capacity (4,495 mgy) and operating production (4,445 mgy) in the country.^{72, 73} In 2018, Missouri produced 6.28 million barrels of ethanol.⁷⁴

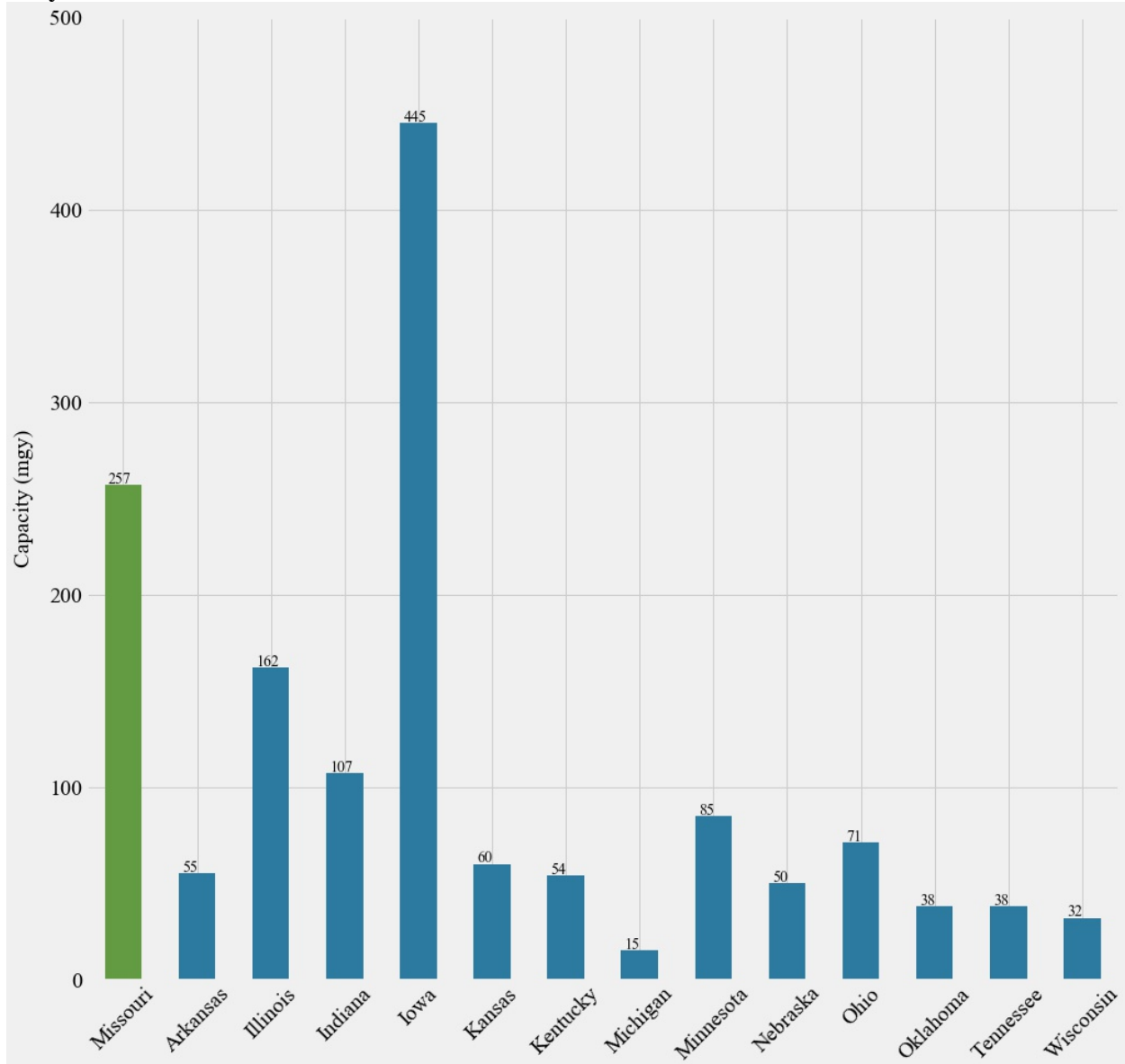
Figure 3.14. Ethanol Production Capacity in Missouri and Comparison States



Source: Renewable Fuels Association. 2020. [2020 Ethanol Industry Outlook](#), Page 3.

As shown in Figure 3.15, EIA data indicate Missouri had the second-highest annual biodiesel production capacity of the comparison states in May 2020, at 257 mgy. Iowa's annual biodiesel production capacity was 445 mgy.⁷⁵ However, data from the Missouri Soybean Association and Missouri Soybean Merchandising Council indicated that, as of April 2020, Missouri's total nameplate capacity was 216 million gallons.⁷⁶ In 2018, Missouri produced 5.2 million barrels of biodiesel, behind only Iowa and Texas.⁷⁷

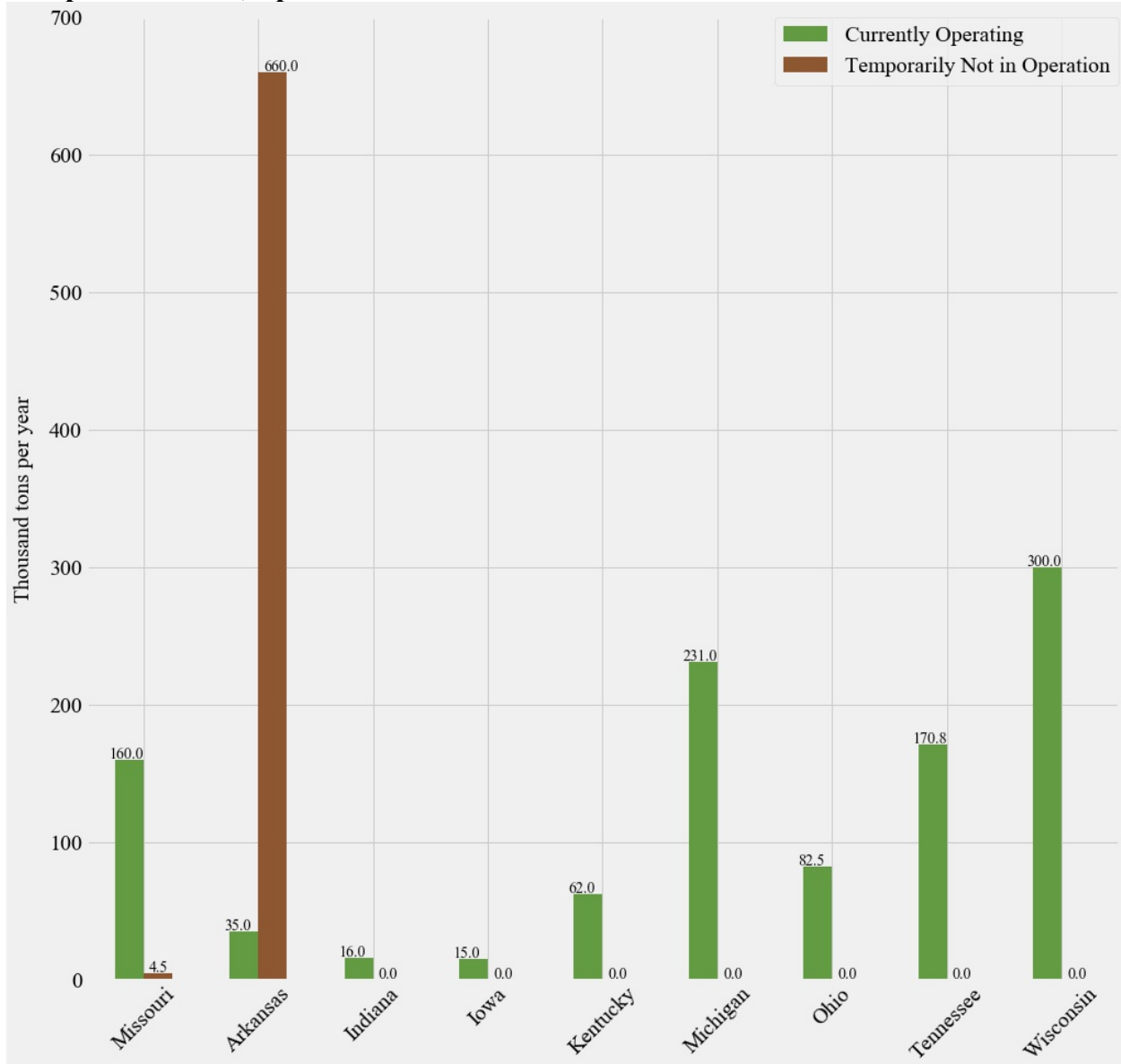
Figure 3.15. Annual Biodiesel Production Capacity in Missouri and Comparison States, May 2020



Source: U.S. Energy Information Administration. 2020. "[Table 4. Biodiesel producers and production capacity by state, May 2020.](#)" *Monthly Biodiesel Production Report*. July 31. Page 8.

Figure 3.16 provides data on densified biomass fuel manufacturing capacity in Missouri and those comparison states for which data were available for April 2020. As indicated in the figure, Missouri had 164,500 tons per year of annual capacity, of which 160,000 tons per year were in operation.⁷⁸

Figure 3.16. Densified Biomass Fuel Manufacturing Capacity in Missouri and Select Comparison States, April 2020



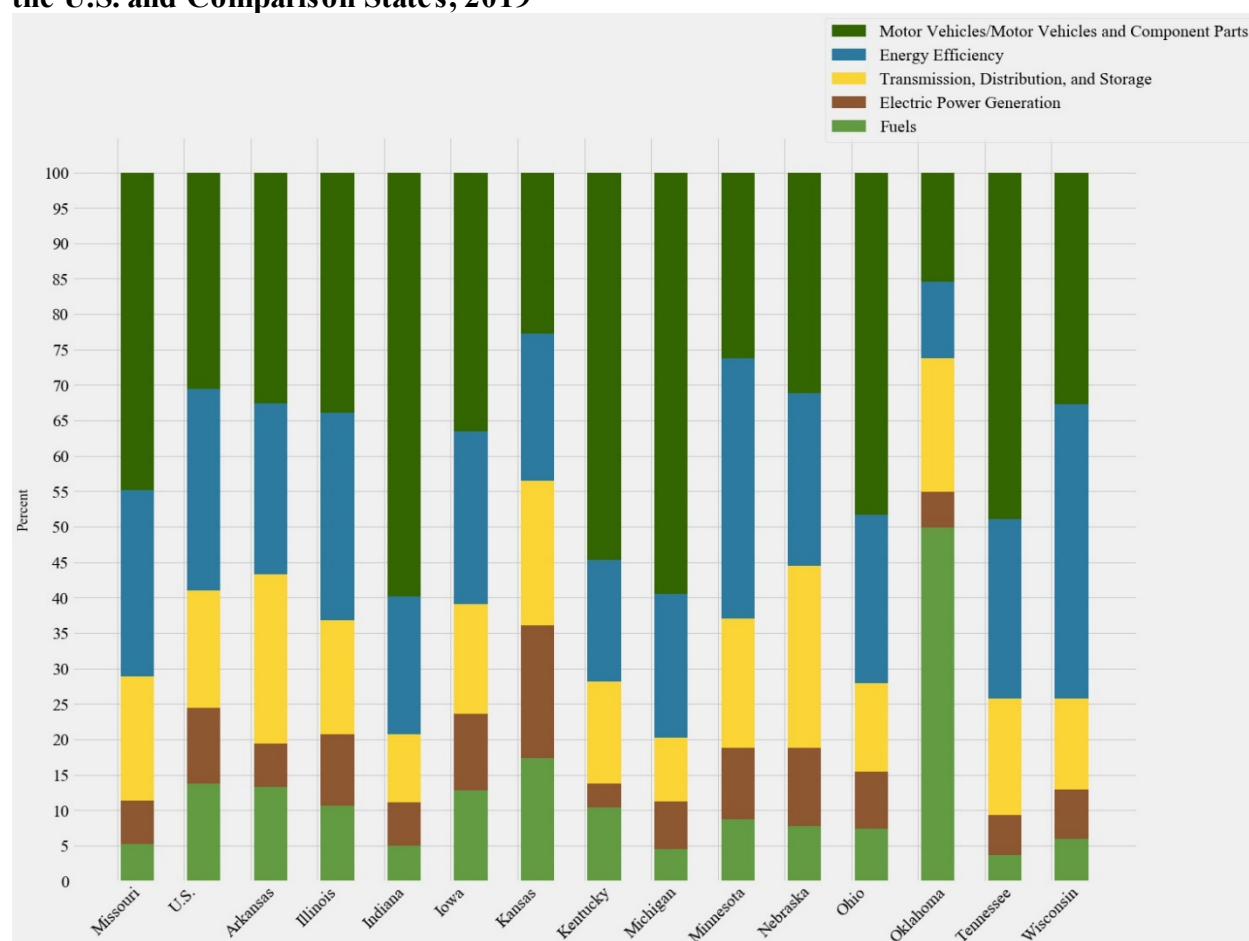
Source: U.S. Energy Information Administration. 2020. "[Table 1. Densified biomass fuel manufacturing facilities in the United States by state, region, and capacity, April 2020.](#)" *Monthly Densified Biomass Fuel Report*. July 15.

4. Additional Statistics

a. Jobs

Figure 4.1 provides the share of energy employment by major technology application in 2019 for Missouri, the U.S., surrounding states and Indiana, Michigan, Minnesota, Ohio and Wisconsin. Missouri had approximately 161,621 energy jobs, including 8,476 in fuels, 9,796 in electric power generation, 28,386 in transmission, distribution and storage, 42,537 in energy efficiency and 72,427 in motor vehicles.⁷⁹ The total number of energy jobs in Missouri was just above the median for the group of comparison states.⁸⁰ The percentage of Missouri energy jobs in motor vehicles was higher than for the U.S. as a whole for motor vehicles and component parts,⁸¹ and Missouri had the fourth-highest percentage of jobs in energy efficiency compared to the other states in the figure.⁸²

Figure 4.1. Share of Energy Employment by Major Technology Application in Missouri, the U.S. and Comparison States, 2019



Sources: National Association of State Energy Officials and Energy Futures Initiative. 2020. [2020 U.S. Energy & Employment Report](#). Pages 2, 39, 90, 124, and 147.

National Association of State Energy Officials and Energy Futures Initiative. 2020. [Energy Employment by State – 2020](#). 2020 U.S. Energy & Employment Report. Pages AR-1, IL-1, IN-1, IA-1, KS-1, KY-1, MI-1, MN-1, MO-1, NE-1, OH-1, OK-1, TN-1, and WI-1.

Motor vehicles employment grew 1.8% in Missouri over the previous year, while energy efficiency jobs grew 1.7%.⁸³ Jobs in the other three major technology applications declined by 0.2%.⁸⁴ The majority of Missouri fuels jobs were in the oil and other petroleum field.⁸⁵ Traditional fossil fuel generation comprised the most jobs in electric power generation in Missouri (3,085 jobs), with solar jobs second-highest (3,079 jobs, including 432 jobs involving solar less than 50% of the time).⁸⁶ Traditional heating, ventilation and air conditioning comprised the most Missouri energy efficiency jobs.⁸⁷

Additional information is available in the [2020 U.S. Energy & Employment Report](#) and [Energy Employment by State – 2020](#).

b. Ratings and Rankings

The American Society of Civil Engineers' (ASCE) Committee on America's Infrastructure grades national infrastructure based on capacity, condition, funding, future need, operation and maintenance, public safety, resilience and innovation.⁸⁸ The ASCE also provides infrastructure letter-grades for certain states. Table 4.1 shows the grades for Missouri, the U.S. and those comparison states for which grades are available. The table also shows ASCE grades related to energy, where available. Missouri's overall grade of C- is higher than that for the U.S. The state's energy grade matches that of the U.S.⁸⁹

Table 4.1. ASCE Infrastructure Grades for Missouri, Illinois, Iowa, Kansas, Kentucky, Michigan, Minnesota, Oklahoma, Tennessee and the U.S.

	Overall Grade	Energy Grade
Missouri	C-	D+
Illinois	C-	No Grade
Iowa	C	C+
Kansas	C	C+
Kentucky	C-	B-
Michigan	D+	C-
Minnesota	C	C
Oklahoma	C-	No Grade
Tennessee	C	No Grade
U.S.	D+	D+

Source: American Society for Civil Engineering. 2020. "[America's Infrastructure Grade](#)." 2017 Infrastructure Report Card.
American Society for Civil Engineering. 2020. "[State Infrastructure Facts](#)." 2017 Infrastructure Report Card.

The American Council for an Energy-Efficient Economy (ACEEE) publishes an annual *State Energy Efficiency Scorecard*. The scorecard in 2019 considered, "Utility and public benefit programs and policies," "Transportation policies," "Building energy efficiency policies," "Policies encouraging CHP systems," "State government-led initiatives around energy efficiency," and, "Appliance and equipment standards."⁹⁰ Missouri ranked 30th in the 2019 scorecard, earning scores above the national median for combined heat and power and state government initiatives but below the national median for utilities, transportation and building

policies.⁹¹ Missouri's ranking increased, but the state scored a half point less over the prior year.⁹² Of the surrounding states, Illinois and Iowa (ranked 11 and 23, respectively) ranked higher than Missouri, and Missouri tied with Tennessee and Idaho.⁹³ Table 4.2 provides the 2019 rankings for Missouri and the comparison states.

Table 4.2. ACEEE Rankings for Missouri and Comparison States, 2019

	ACEEE Rank
Missouri	30
Arkansas	33
Illinois	11
Indiana	40
Iowa	23
Kansas	46
Kentucky	38
Michigan	13
Minnesota	8
Nebraska	43
Ohio	33
Oklahoma	37
Tennessee	30
Wisconsin	25

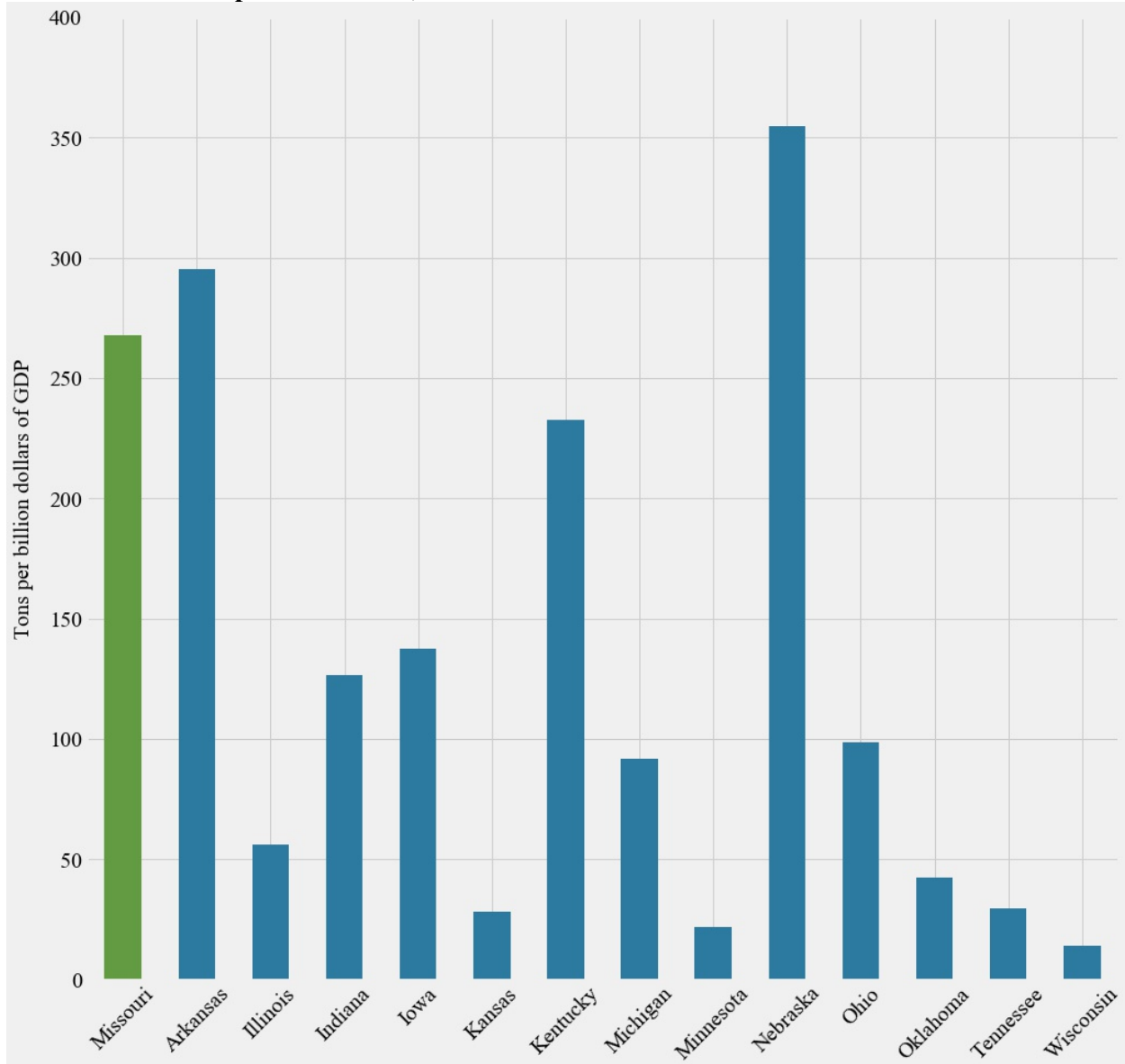
Source: Berg, Weston, Vaidyanathan, Shruti, Junga, Eric, Cooper, Emma, Perry, Chris, Relf, Grace, Whitlock, Andrew, DiMascio, Marianne, Waters, Corri, and Cortez, Nadia. 2019. [The 2019 State Energy Efficiency Scorecard](#). American Council for an Energy-Efficient Economy. Page 8.

c. Emissions

The U.S. Environmental Protection Agency provides air pollution emissions trend data estimates by state and source. These data cover criteria air pollutants and precursors, excluding lead, such as sulfur dioxide (SO₂) and nitrogen oxides (NO_x). Data availability and quality vary by sector and pollutant.⁹⁴ Presented below are 2019 SO₂ and NO_x emissions data for those sectors with quality data available: fuel combustion in the electric utilities sector, highway vehicles and off-highway mobile sources. The data include Missouri, surrounding states and Indiana, Michigan, Minnesota, Ohio and Wisconsin. Many factors can contribute to differences in emissions, such as total GDP, economic profiles, fuel mixes and population sizes; to partly address such variation, the data below are unitized by GDP.

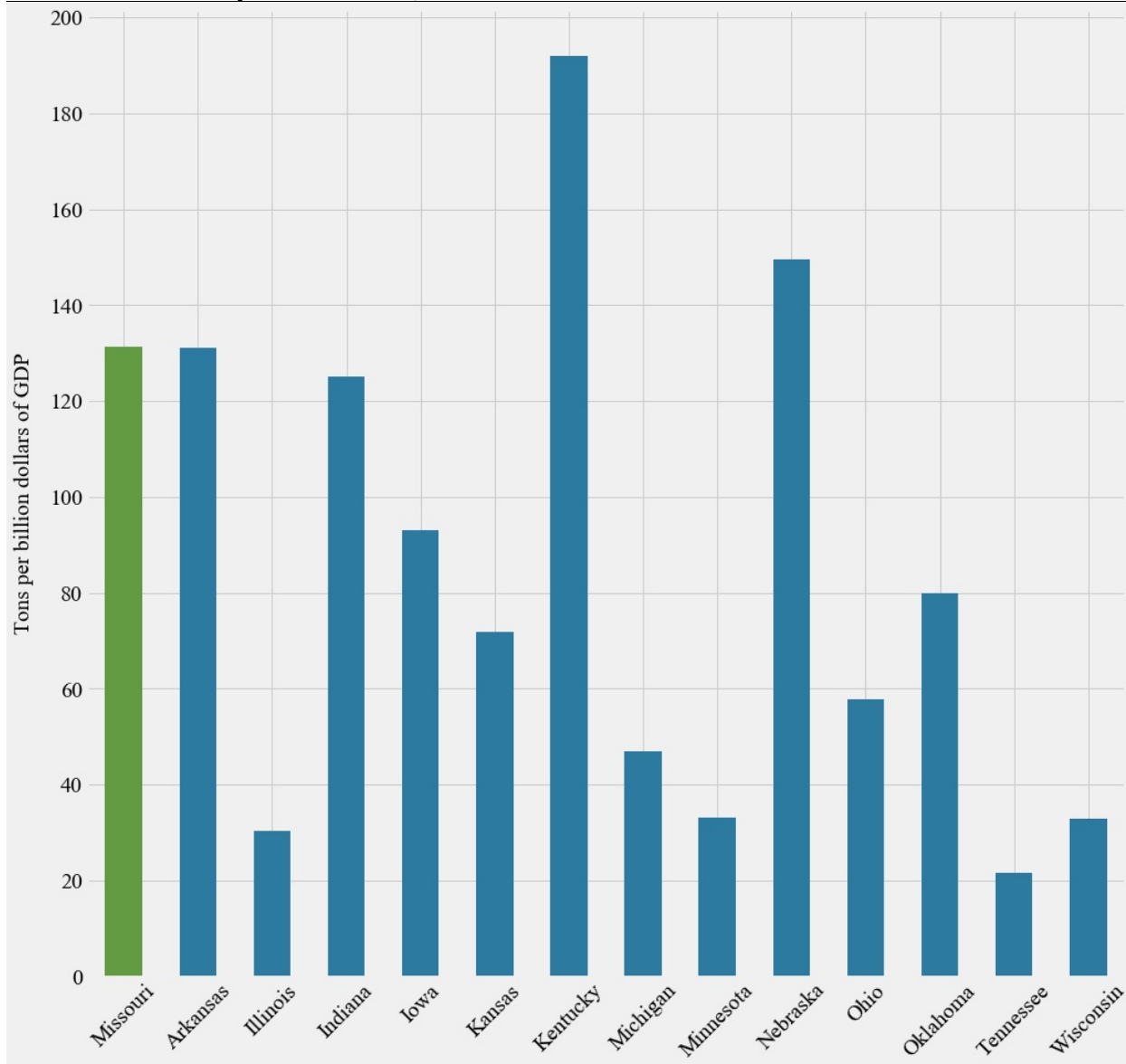
Of the comparison states, Missouri had the third-highest SO₂ emissions from fuel combustion in the electric utilities sector in 2019 on a tons per billion dollars of GDP basis. Missouri also had the third-highest emissions of NO_x from fuel combustion in the electric utilities sector in 2019 on a tons per billion dollars of GDP basis.⁹⁵

Figure 4.2. SO₂ Emissions From Fuel Combustion in the Electric Utilities Sector in Missouri and Comparison States, 2019



Sources: U.S. Environmental Protection Agency. 2020. "[Air Pollutant Emissions Trends Data: State Annual Emissions Trend](#)." Air Emissions Inventories.
U.S. Bureau of Economic Analysis. 2020. "[SAGDP1 Gross Domestic Product \(GDP\) summary, annual by state](#)." Regional Economic Accounts – GDP and Personal Income.

Figure 4.3. NO_x Emissions From Fuel Combustion in the Electric Utilities Sector in Missouri and Comparison States, 2019

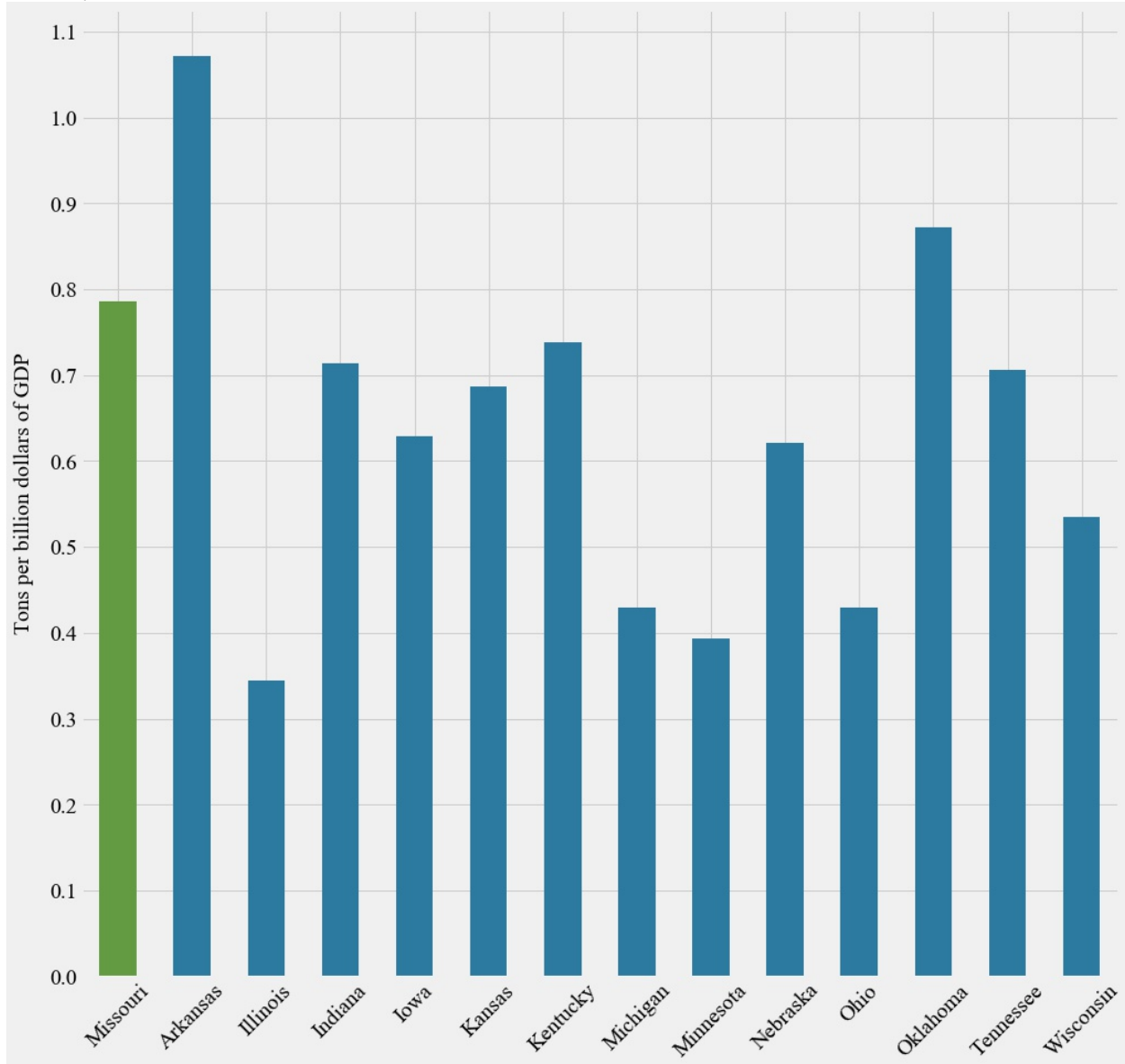


Sources: U.S. Environmental Protection Agency. 2020. "[Air Pollutant Emissions Trends Data: State Annual Emissions Trend](#)." Air Emissions Inventories.

U.S. Bureau of Economic Analysis. 2020. "[SAGDP1 Gross Domestic Product \(GDP\) summary, annual by state](#)." Regional Economic Accounts – GDP and Personal Income.

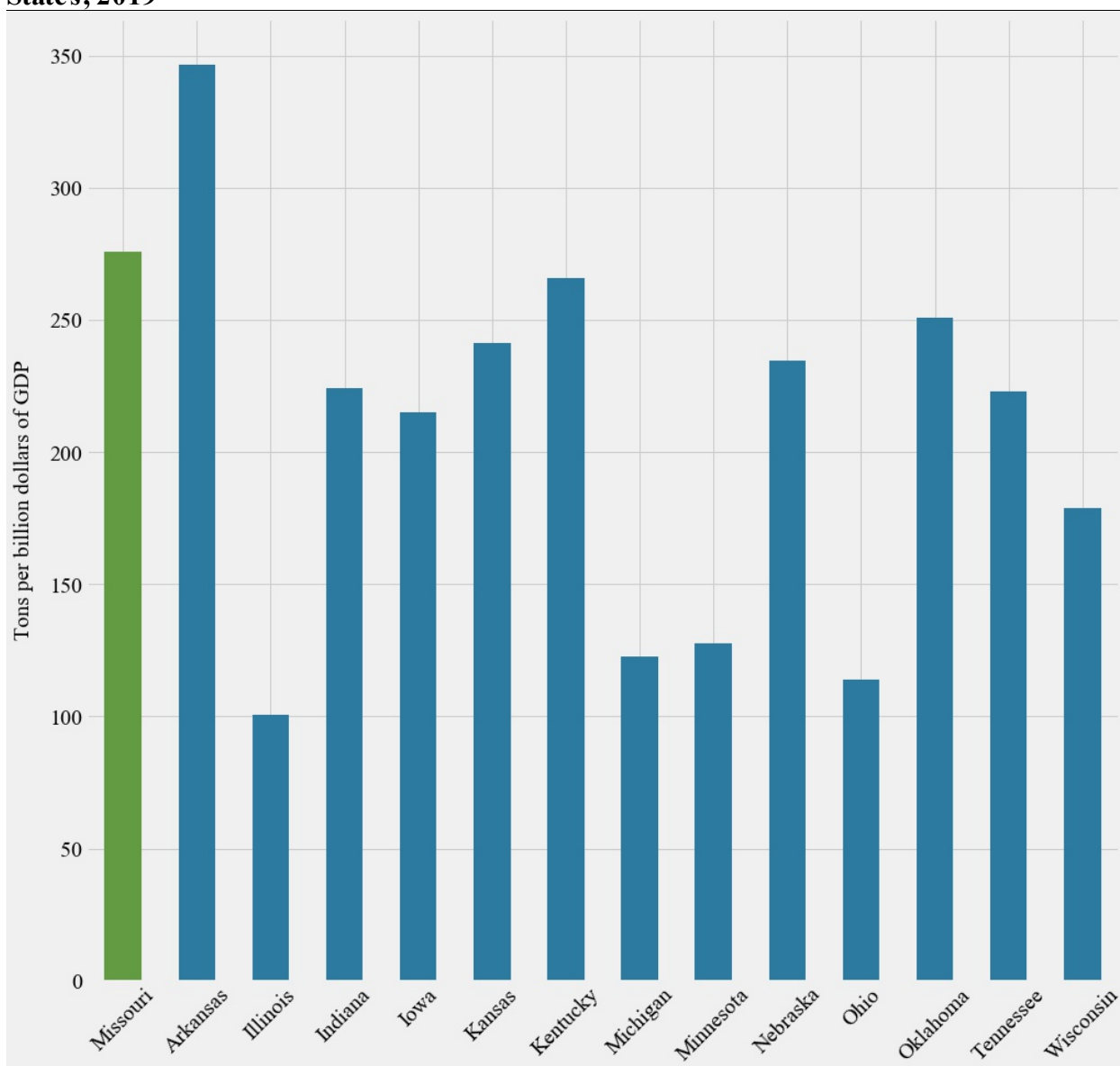
Of the comparison states, Missouri had the third-highest emissions of SO₂ from the highway vehicles sector in 2019 on a tons per billion dollars of GDP basis. Missouri had the second-highest emissions of NO_x from the highway vehicles sector in 2019 on a tons per billion dollars of GDP basis.⁹⁶

Figure 4.4. SO₂ Emissions From the Highway Vehicles Sector in Missouri and Comparison States, 2019



Sources: U.S. Environmental Protection Agency. 2020. "[Air Pollutant Emissions Trends Data: State Annual Emissions Trend](#)," Air Emissions Inventories.
U.S. Bureau of Economic Analysis. 2020. "[SAGDP1 Gross Domestic Product \(GDP\) summary, annual by state](#)," Regional Economic Accounts – GDP and Personal Income.

Figure 4.5. NO_x Emissions From the Highway Vehicles Sector in Missouri and Comparison States, 2019

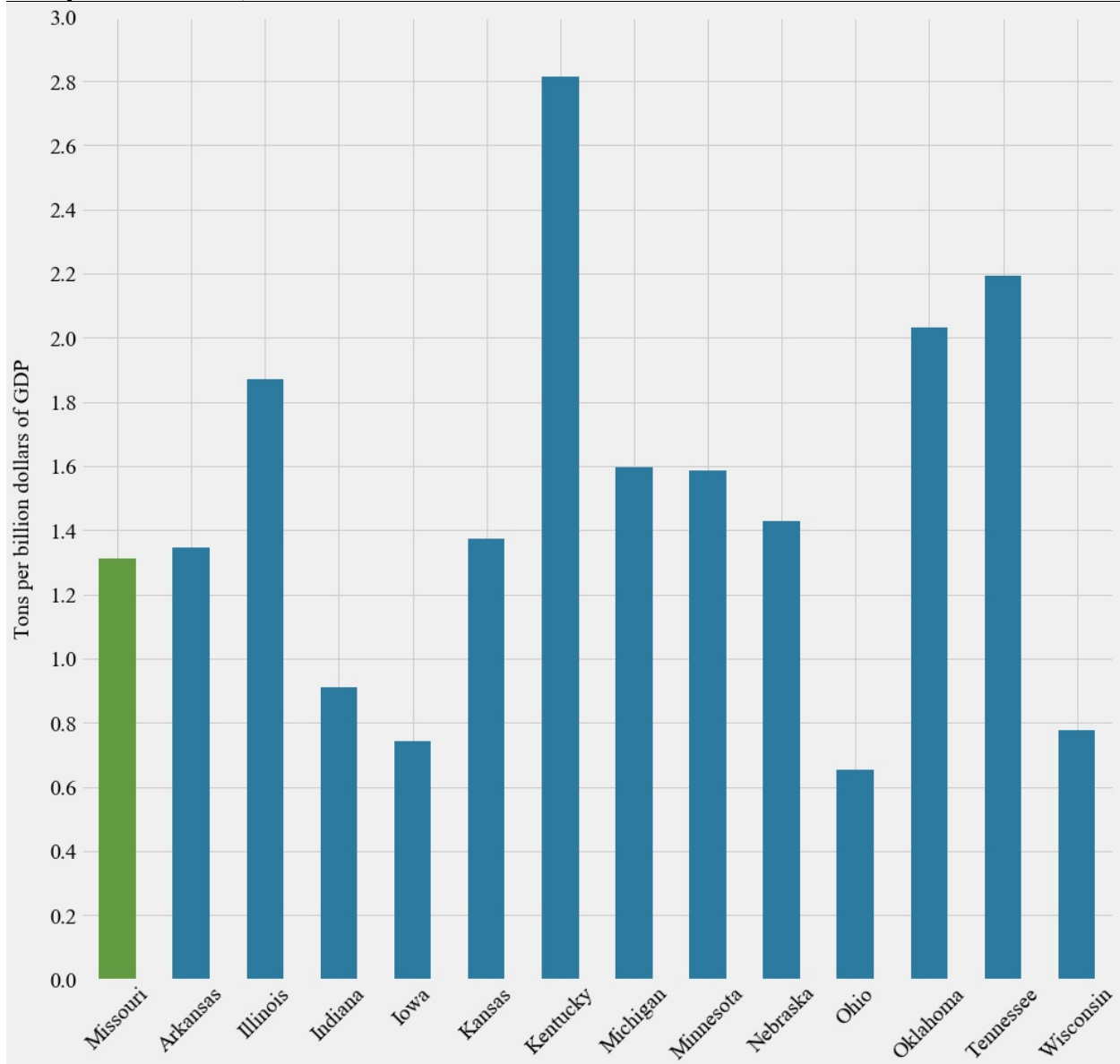


Sources: U.S. Environmental Protection Agency. 2020. "[Air Pollutant Emissions Trends Data: State Annual Emissions Trend](#)." Air Emissions Inventories.

U.S. Bureau of Economic Analysis. 2020. "[SAGDP1 Gross Domestic Product \(GDP\) summary, annual by state](#)." Regional Economic Accounts – GDP and Personal Income.

Missouri had the tenth-highest SO₂ emissions from the off-highway mobile source sector of the comparison states in 2019 on a tons per billion dollars of GDP basis. Missouri had the fifth-highest NO_x emissions from the off-highway mobile source sector of the comparison states in 2019 on a tons per billion dollars of GDP basis.⁹⁷

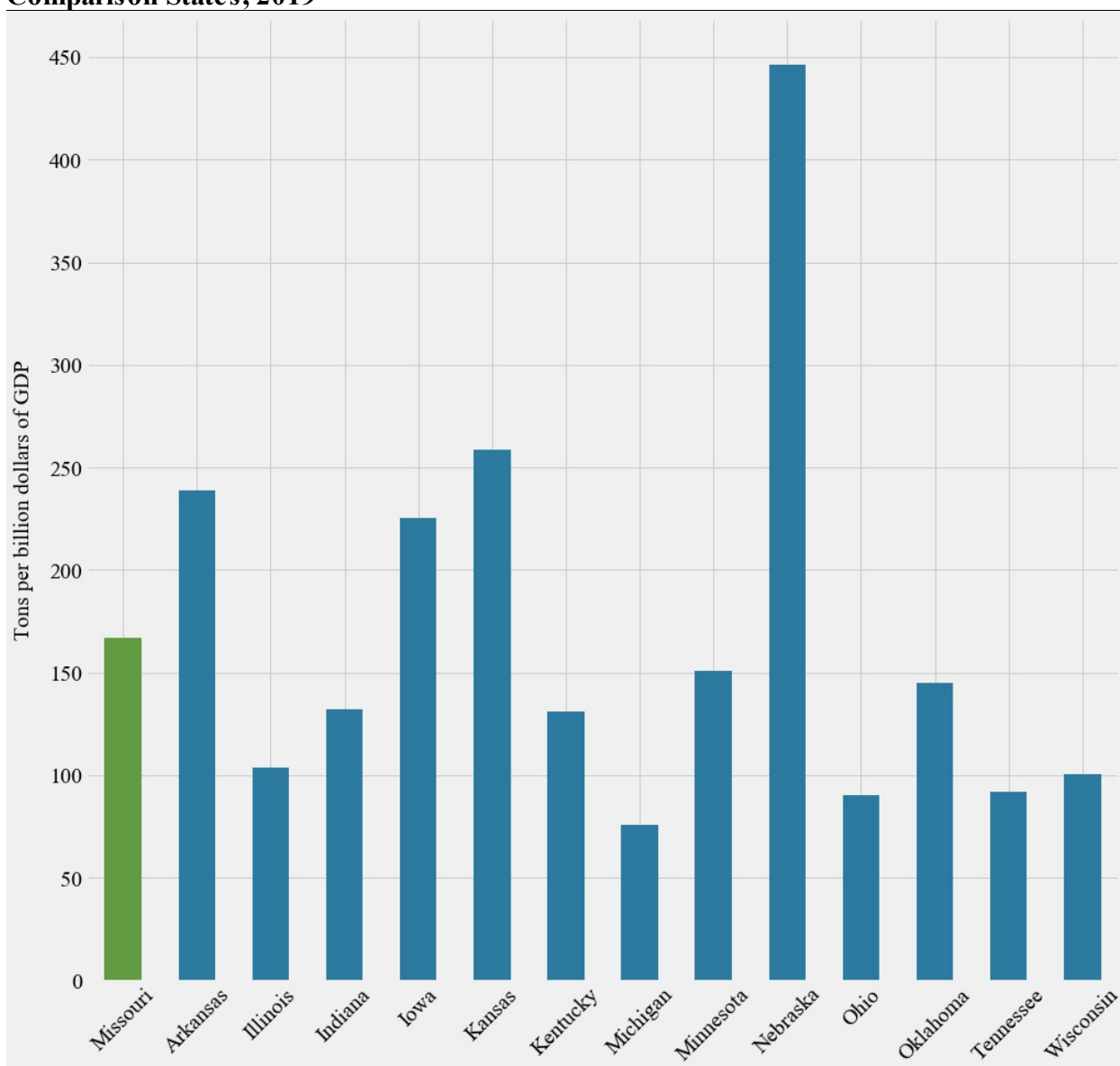
Figure 4.6. SO₂ Emissions From the Off-Highway Mobile Source Sector in Missouri and Comparison States, 2019



Sources: U.S. Environmental Protection Agency. 2020. "[Air Pollutant Emissions Trends Data: State Annual Emissions Trend](#)." Air Emissions Inventories.

U.S. Bureau of Economic Analysis. 2020. "[SAGDP1 Gross Domestic Product \(GDP\) summary, annual by state](#)." Regional Economic Accounts – GDP and Personal Income.

Figure 4.7. NO_x Emissions From the Off-Highway Mobile Source Sector in Missouri and Comparison States, 2019

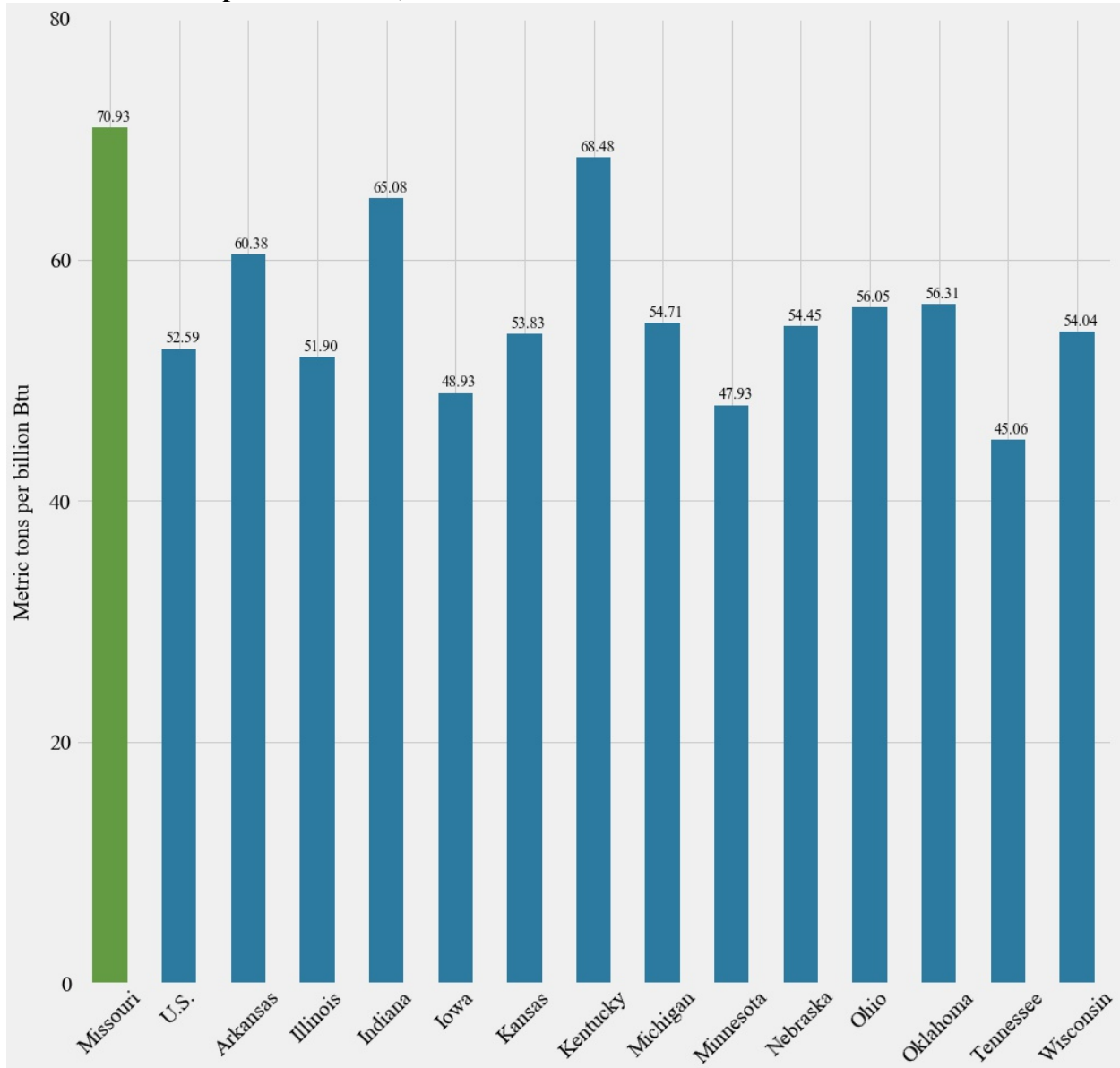


Sources: U.S. Environmental Protection Agency. 2020. "[Air Pollutant Emissions Trends Data: State Annual Emissions Trend](#)." Air Emissions Inventories.

U.S. Bureau of Economic Analysis. 2020. "[SAGDP1 Gross Domestic Product \(GDP\) summary, annual by state](#)." Regional Economic Accounts – GDP and Personal Income.

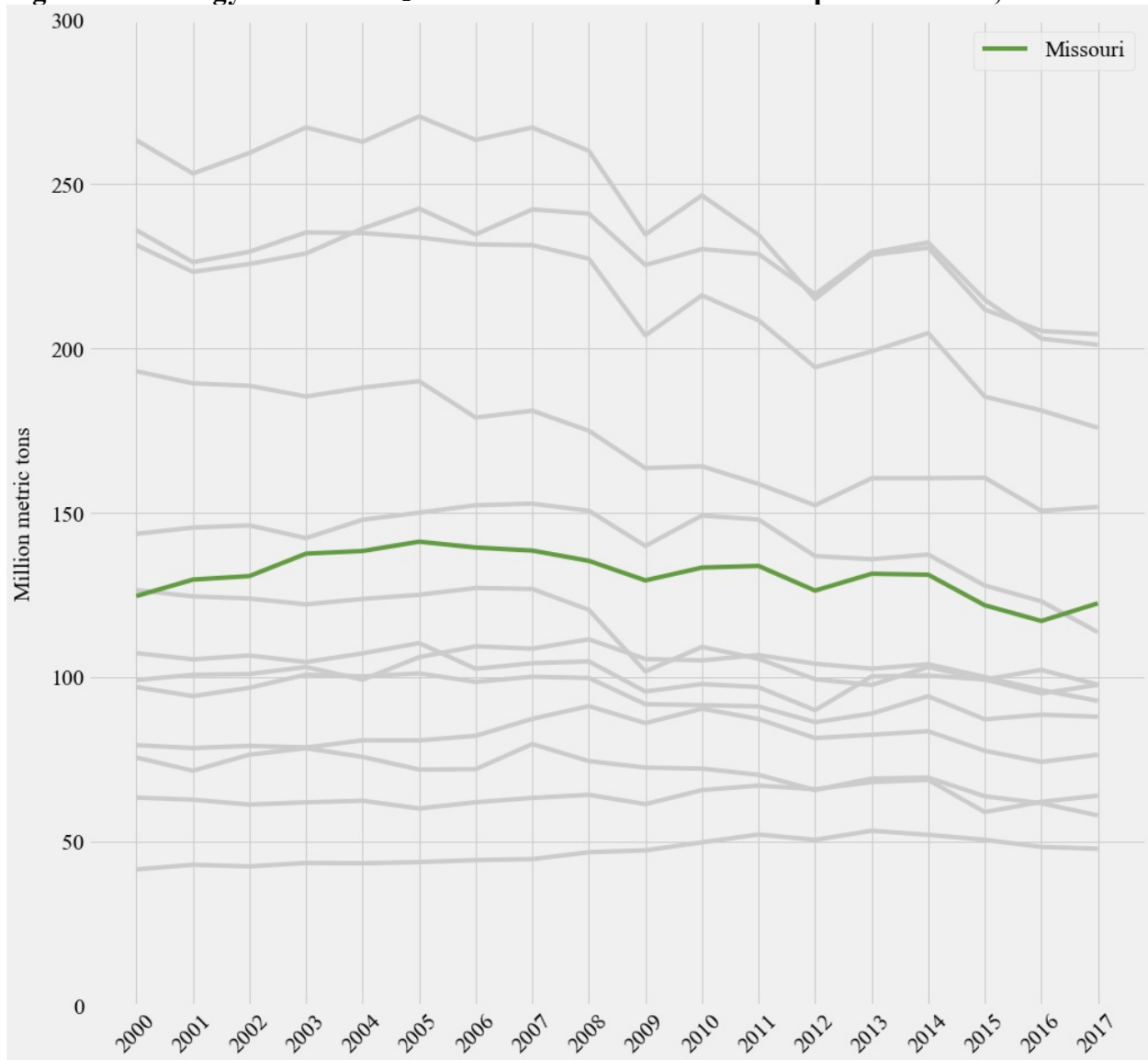
EIA provides data on energy-related carbon dioxide (CO₂) emissions by state, including data by sector (residential, commercial, industrial, transportation and electric power) and fuel (coal, petroleum and natural gas). Total emissions for each state can be compared by dividing emissions by total energy consumption, which partly controls for differences such as end-use efficiencies, total GDP, economic profiles and population. As shown in Figure 4.8, energy usage in Missouri produced 70.93 metric tons of CO₂ per billion Btu in 2017.⁹⁸ Figure 4.9 shows energy-related emissions from 2000 through 2017 for Missouri and the comparison states. Total energy-related carbon dioxide emissions in Missouri were in the middle of the range of emissions of the comparison states.⁹⁹

Figure 4.8. Energy-Related CO₂ Emissions per Unit of Energy Consumption in Missouri, the U.S. and Comparison States, 2017



Sources: U.S. Energy Information Administration. 2020. "[State Carbon Dioxide Emissions Data: Table 2. State energy-related carbon dioxide emissions by year, adjusted \(1990-2017\)](#)." Environment.
U.S. Energy Information Administration. 2020. "[Total Energy Consumption Estimates by End-Use Sector, 1960-2018](#)." State Energy Data System.

Figure 4.9. Energy-Related CO₂ Emissions in Missouri and Comparison States, 2000-2017



Source: U.S. Energy Information Administration. 2020. "[State Carbon Dioxide Emissions Data: Table 2. State energy-related carbon dioxide emissions by year, adjusted \(1990-2017\).](#)" Environment.

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5. Notes

¹ Note that the source of the statistics for Missouri oil production in this table differs from that used later in the report.

Abbreviations used in this table include “Btu” for British thermal units, “MW” for megawatt, and “GWh” for gigawatt-hour. One gigawatt-hour is equivalent to one-million kilowatt-hours.

² U.S. Census Bureau. 2019. “[QuickFacts: United States; Missouri](#).”

³ U.S. Bureau of Labor Statistics. 2020. “[Missouri](#).” Economy at a Glance.

U.S. Bureau of Labor Statistics. 2020. “[Labor Force Statistics from the Current Population Survey](#).” Databases, Tables & Calculators by Subject.

⁴ U.S. Bureau of Economic Analysis. 2020. “[SAGDP1 Gross Domestic Product \(GDP\) summary, annual by state](#).” Regional Economic Accounts – GDP and Personal Income.

⁵ Federal Reserve Bank of St. Louis. 2020. “[Release Tables: Per Capita Personal Income by State, Annual](#).”

Releases: State Per Capita Personal Income.

⁶ U.S. Energy Information Administration. 2020. “[Missouri State Energy Profile](#).” State Energy Data System.

⁷ U.S. Energy Information Administration. 2020. “[Table P2. Primary Energy Production Estimates in Trillion Btu, 2018](#).” *State Energy Production Estimates: 1960 Through 2018*. State Energy Data System. Page 4.

U.S. Energy Information Administration. 2020. “[Crude Oil Production](#).” Petroleum & Other Liquids.

Missouri Department of Natural Resources, Missouri Geological Survey, Geological Survey Program. 2020. [2019 Annual Oil Production Figures](#). Page 1.

U.S. Energy Information Administration. 2020. “[Table 2. Coal production by state](#).” *Quarterly Coal Report*. April 1. Page 3.

⁸ Note that the source of data for oil production differs from that used in Section 3.

⁹ U.S. Energy Information Administration. 2020. “[Table C10. Total Energy Consumption Estimates, Real Gross Domestic Product \(GDP\), Energy Consumption Estimates](#).” State Energy Data System.

¹⁰ U.S. Energy Information Administration. 2020. “[Table E15. Total Energy Price and Expenditure Estimates \(Total per Capita, and per GDP\), Ranked by State, 2018](#).” State Energy Data System.

¹¹ U.S. Energy Information Administration. 2020. “[Missouri State Energy Profile](#).” State Energy Data System.

¹² U.S. Energy Information Administration. 2020. “[Table C14. Total Energy Consumption Estimates per Capita by End-Use Sector, Ranked by State, 2018](#).” State Energy Data System.

U.S. Energy Information Administration. 2020. “[Table E15. Total Energy Price and Expenditure Estimates \(Total per Capita, and per GDP\), Ranked by State, 2018](#).” State Energy Data System.

¹³ Note that the source of data for oil production differs from that used in Section 3.

¹⁴ Note that numbers in this document may not always add to 100.00% due to rounding.

¹⁵ U.S. Energy Information Administration. 2020. “[Table CT2. Primary Energy Consumption Estimates, Selected Years, 1960-2018, Missouri](#).” *State Energy Data 2018: Consumption*. State Energy Data System. Pages 288-289.

¹⁶ U.S. Energy Information Administration. 2020. “[Table C1. Energy Consumption Overview: Estimates by Energy Source and End-Use Sector, 2018](#).” State Energy Data System.

¹⁷ U.S. Census Bureau. 2018. “[B25040: House Heating Fuel](#).” 2014-2018 American Community Survey 5-Year Estimates.

¹⁸ U.S. Energy Information Administration. 2018. “[Table CE3.1 Annual household site end-use consumption in the U.S.—totals and averages, 2015](#).” *2015 Residential Energy Consumption Survey: Energy Consumption and Expenditures Tables*. Page 1.

¹⁹ U.S. Energy Information Administration. 2019. “[Table E1. Major fuel consumption \(Btu\) by end use, 2012](#).” Commercial Buildings Energy Consumption Survey (CBECS).

²⁰ U.S. Energy Information Administration. Undated. “[2018 CBECS Survey Data](#).” Commercial Buildings Energy Consumption Survey (CBECS).

²¹ Missouri Department of Economic Development. 2017. “[County Building Codes for Missouri](#).” State of Missouri Data Portal.

Missouri Department of Economic Development. 2018. “[City Building Codes for Missouri](#).” State of Missouri Data Portal.

Supplemental data provided by the Midwest Energy Efficiency Alliance.

²² See Rossberg, Jim, and Leon, Roberto T., 2013, “[Evolution of Codes in the USA](#).”

- ²³ U.S. Energy Information Administration. 2019. "[Participation in electricity customer choice programs has remained unchanged since 2013](#)." Today in Energy. November 1.
- ²⁴ See U.S. Energy Information Administration, 2020, "[Appendix C: Technical Notes](#)," *Electric Power Monthly*, March 24, page 6, and U.S. Energy Information Administration, 2019, "[Technical Notes](#)," *Electric Power Annual*, pages 10, 15, and 16.
- ²⁵ "Transportation" is defined by EIA in this context as being related to transit systems. See U.S. Energy Information Administration, 2020, "[Appendix C: Technical Notes](#)," *Electric Power Monthly*, March 24, page 5, and U.S. Energy Information Administration, 2019, "[Technical Notes](#)," *Electric Power Annual*, pages 9 and 15.
- ²⁶ U.S. Energy Information Administration. 2020. "[Retail sales of electricity](#)." Electricity Data Browser.
- ²⁷ *Ibid.*
- ²⁸ One megawatt-hour is equivalent to one-thousand kilowatt-hours.
- ²⁹ U.S. Energy Information Administration. 2020. "[2018 Utility Bundled Retail Sales- Total](#)." Electric Sales, Revenue, and Average Price.
- ³⁰ Missouri Public Service Commission. 2019. *PSC Annual Report 2019*. Page 41.
- ³¹ U.S. Energy Information Administration. 2020. "[Average retail price of electricity](#)." Electricity Data Browser.
- ³² *Ibid.*
- ³³ *Ibid.*
- ³⁴ U.S. Energy Information Administration. 2020. "[Revenue from retail sales of electricity](#)." Electricity Data Browser.
- ³⁵ *Ibid.*
- ³⁶ This data document was completed on Sept. 17, 2020. EIA is expected to update its natural gas data in later September. The data in this document and the associated hyperlinks in certain citations will not reflect this update at the time of publication.
- ³⁷ U.S. Energy Information Administration. 2019. "[Natural gas customer choice programs](#)." Natural gas explained.
- ³⁸ U.S. Energy Information Administration. 2020. "[Natural Gas Summary](#)." Natural Gas. These data do not include lease and plant fuel or pipeline and distribution use.
- ³⁹ See U.S. Energy Information Administration, 2019, "[Appendix A: Summary of Data Collection and Reporting Methodology](#)," *Natural Gas Annual*, page 191.
- ⁴⁰ U.S. Energy Information Administration. 2020. "[Natural Gas Summary](#)." Natural Gas.
- ⁴¹ Missouri Public Service Commission. 2019. *PSC Annual Report 2019*. Page 41.
- ⁴² Due to a significant lack of complete data on commercial and industrial sector natural gas prices in certain instances from EIA, prices for these two sectors are not included in this report. See U.S. Energy Information Administration, 2019, "[Appendix A: Summary of Data Collection and Reporting Methodology](#)," *Natural Gas Annual*, page 192, and U.S. Energy Information Administration, 2019, "[Table 24. Average price of natural gas delivered to consumers by state and sector, 2018](#)," *Natural Gas Annual*, page 67.
- ⁴³ See U.S. Energy Information Administration, 2019, "[Table 24. Average price of natural gas delivered to consumers by state and sector, 2018](#)," *Natural Gas Annual*, page 67.
- ⁴⁴ U.S. Energy Information Administration. 2020. "[Natural Gas Prices](#)." Natural Gas.
- ⁴⁵ U.S. Energy Information Administration. 2020. "[Table CT7. Transportation Sector Energy Consumption Estimates, 1960-2018, Missouri](#)." State Energy Data System. Note that the data presented here incorporate fuel ethanol blended into motor gasoline and biodiesel blended into distillate fuel oil.
- ⁴⁶ U.S. Energy Information Administration. 2020. "[Table E13. Transportation Sector Energy Expenditure Estimates, 2018](#)." State Energy Data System. Note that the data presented here incorporate fuel ethanol blended into motor gasoline and biodiesel blended into distillate fuel oil. See U.S. Energy Information Administration, 2020, *State Energy Data System 2018—Consumption Technical Notes*, State Energy Data System, page 92.
- ⁴⁷ U.S. Energy Information Administration. 2020. "[Table CT7. Transportation Sector Energy Consumption Estimates, 1960-2018, Missouri](#)." State Energy Data System. Note that for these data, EIA also includes, "... the operation of pipelines, primarily in compressors ..." in its definition of natural gas used for transportation.
- ⁴⁸ U.S. Energy Information Administration. Undated. "[Glossary](#)."
- ⁴⁹ U.S. Energy Information Administration. 2020. "[Table F11: Hydrocarbon Gas Liquids Consumption Estimates, 2018](#)." State Energy Data System.
- ⁵⁰ U.S. Energy Information Administration. 2020. "[Table F12: Hydrocarbon Gas Liquids Price and Expenditure Estimates, 2018](#)." State Energy Data System.
- ⁵¹ U.S. Energy Information Administration. 2020. "[Residential Propane Weekly Heating Oil and Propane Prices \(October - March\)](#)." Petroleum & Other Liquids.
- ⁵² "Other industrial" is defined by EIA as:

All industrial sector fuel use other than in ‘Coke Plants.’ An energy-consuming sector that consists of all facilities and equipment used for producing, processing, or assembling goods. The industrial sector encompasses the following types of activity manufacturing; agriculture, forestry, fishing and hunting; mining; and construction. Overall energy use in this sector is largely for process heat and cooling and powering machinery, with lesser amounts used for facility heating, air conditioning, and lighting.

See U.S. Energy Information Administration, 2019, “[Filter Value Definitions](#),” Coal Data Browser.

⁵³ U.S. Energy Information Administration. 2019. “[Total consumption \(short tons\)](#),” Coal Data Browser.

⁵⁴ As used in this report, “pumped storage” refers to hydroelectric pumped storage.

⁵⁵ See U.S. Energy Information Administration, 2020, “[Appendix C: Technical Notes](#),” *Electric Power Monthly*, March 24, page 20, and U.S. Energy Information Administration, 2019, “[Technical Notes](#),” *Electric Power Annual*, pages 12-13 and 22-23.

⁵⁶ U.S. Energy Information Administration. 2019. “[Form EIA-860 detailed data with previous form data \(EIA-860A/860B\)](#),” Schedule 1 – Utility Data, Schedule 3 – Generator Data, and Content and Layout of the Annual Electric Generator Report (EIA-860) Data Files for 2018. Electricity.

⁵⁷ *Id.*

⁵⁸ *Id.*

⁵⁹ American Wind Energy Association. 2020. “[State Facts Sheets](#),” Resources – Fact Sheets.

⁶⁰ Solar Energy Industries Association. 2020. “[Solar State by State](#).”

⁶¹ One gigawatt-hour is equivalent to one-million kilowatt-hours.

⁶² U.S. Energy Information Administration. 2020. “[Net generation for all sectors](#),” Electricity Data Browser.

⁶³ *Ibid.* Note that EIA data on utility-scale solar for Indiana in 2012 are interpreted to equal zero in this document because of EIA’s designation of such data as, “Not meaningful due to large relative standard error.”

⁶⁴ U.S. Energy Information Administration. 2020. “[Net generation for all sectors](#),” Electricity Data Browser.

⁶⁵ U.S. Energy Information Administration. 2020. “[Table 2. Coal production by state](#),” *Quarterly Coal Report*. April 1. Page 3.

⁶⁶ U.S. Energy Information Administration. 2019. “[Aggregate coal mine production for total](#),” Coal Data Browser.

U.S. Energy Information Administration. 2019. “[List of mines for all coal, total, Missouri, all mine statuses](#),” Coal Data Browser.

⁶⁷ U.S. Energy Information Administration. 2019. “[Shipments from undefined](#),” Coal Data Browser.

⁶⁸ This power plant is owned by Evergy. See Evergy, Inc., 2020, [Evergy 2019 Annual Report](#), page 103.

⁶⁹ U.S. Energy Information Administration. 2019. “[Table OS-13. Domestic Coal Distribution, by Origin State, 2018](#),” *Annual Coal Distribution Report 2018*. Page 18.

⁷⁰ Missouri Department of Natural Resources, Missouri Geological Survey, Geological Survey Program. 2020. [2019 Annual Oil Production Figures](#). Page 1.

Missouri Department of Natural Resources, Missouri Geological Survey, Geological Survey Program. 2020. Email communication. May 14.

⁷¹ U.S. Energy Information Administration. 2020. “[Table P5B. Primary Energy Production Estimates, Renewable and Total Energy, in Trillion Btu, Ranked by State, 2018](#),” *State Energy Production Estimates: 1960 Through 2018*. State Energy Data System. Page 8.

⁷² Renewable Fuels Association. 2020. [2020 Ethanol Industry Outlook](#). Page 3.

⁷³ Note that neither Arkansas nor Oklahoma had any listed production capacity, and that for Iowa, the, “Data includes one operating plant with unknown or undisclosed production volumes.” *Ibid.*

⁷⁴ U.S. Energy Information Administration. 2020. “[Table P1. Primary Energy Production Estimates in Physical Units, 2018](#),” *State Energy Production Estimates: 1960 Through 2018*. State Energy Data System. Page 3.

⁷⁵ U.S. Energy Information Administration. 2020. “[Table 4. Biodiesel producers and production capacity by state, May 2020](#),” *Monthly Biodiesel Production Report*. July 31. Page 8.

⁷⁶ Missouri Department of Natural Resources – Division of Energy. 2020. “[Biofuels](#).”

⁷⁷ U.S. Energy Information Administration. 2020. “[Table P1. Primary Energy Production Estimates in Physical Units, 2018](#),” *State Energy Production Estimates: 1960 Through 2018*. State Energy Data System. Page 3.

⁷⁸ U.S. Energy Information Administration. 2020. “[Table 1. Densified biomass fuel manufacturing facilities in the United States by state, region, and capacity, April 2020](#),” *Monthly Densified Biomass Fuel Report*. July 15.

⁷⁹ National Association of State Energy Officials and Energy Futures Initiative. 2020. [Energy Employment by State – 2020](#). 2020 U.S. Energy & Employment Report. Page MO-1.

⁸⁰ National Association of State Energy Officials and Energy Futures Initiative. 2020. [Energy Employment by State – 2020](#). 2020 U.S. Energy & Employment Report. Pages AR-1, IL-1, IN-1, IA-1, KS-1, KY-1, MI-1, MN-1, MO-1, NE-1, OH-1, OK-1, TN-1, and WI-1.

- ⁸¹ National Association of State Energy Officials and Energy Futures Initiative. 2020. [2020 U.S. Energy & Employment Report](#). Pages 2, 39, 90, 124, and 147.
- National Association of State Energy Officials and Energy Futures Initiative. 2020. [Energy Employment by State – 2020](#). 2020 U.S. Energy & Employment Report. Page MO-1.
- ⁸² National Association of State Energy Officials and Energy Futures Initiative. 2020. [Energy Employment by State – 2020](#). 2020 U.S. Energy & Employment Report. Pages AR-1, IL-1, IN-1, IA-1, KS-1, KY-1, MI-1, MN-1, MO-1, NE-1, OH-1, OK-1, TN-1, and WI-1.
- ⁸³ *Id.*, page MO-1.
- ⁸⁴ *Ibid.*
- ⁸⁵ *Id.*, page MO-3.
- ⁸⁶ *Id.*, page MO-2.
- ⁸⁷ *Id.*, page MO-5.
- ⁸⁸ American Society of Civil Engineers. 2020. “[What Makes a Grade?](#)” 2017 Infrastructure Report Card.
- ⁸⁹ American Society for Civil Engineering. 2020. “[America’s Infrastructure Grade](#).” 2017 Infrastructure Report Card.
- American Society for Civil Engineering. 2020. “[State Infrastructure Facts](#).” 2017 Infrastructure Report Card.
- ⁹⁰ Berg, Weston, Vaidyanathan, Shruti, Junga, Eric, Cooper, Emma, Perry, Chris, Relf, Grace, Whitlock, Andrew, DiMascio, Marianne, Waters, Corri, and Cortez, Nadia. 2019. [The 2019 State Energy Efficiency Scorecard](#). American Council for an Energy-Efficient Economy. Page 2.
- ⁹¹ American Council for an Energy-Efficient Economy. 2019. [Missouri](#). 2019 State Energy Efficiency Scorecard.
- ⁹² Note that ACEEE’s ranking methodology may change between years.
- ⁹³ Berg, Weston, Vaidyanathan, Shruti, Junga, Eric, Cooper, Emma, Perry, Chris, Relf, Grace, Whitlock, Andrew, DiMascio, Marianne, Waters, Corri, and Cortez, Nadia. 2019. [The 2019 State Energy Efficiency Scorecard](#). American Council for an Energy-Efficient Economy. Page 8.
- ⁹⁴ U.S. Environmental Protection Agency. 2020. “[Air Pollutant Emissions Trends Data: State Annual Emissions Trend](#).” Air Emissions Inventories.
- ⁹⁵ *Ibid.*
- U.S. Bureau of Economic Analysis. 2020. “[SAGDP1 Gross Domestic Product \(GDP\) summary, annual by state](#).” Regional Economic Accounts – GDP and Personal Income.
- ⁹⁶ U.S. Environmental Protection Agency. 2020. “[Air Pollutant Emissions Trends Data: State Annual Emissions Trend](#).” Air Emissions Inventories.
- U.S. Bureau of Economic Analysis. 2020. “[SAGDP1 Gross Domestic Product \(GDP\) summary, annual by state](#).” Regional Economic Accounts – GDP and Personal Income.
- ⁹⁷ *Ibid.*
- ⁹⁸ U.S. Energy Information Administration. 2020. “[State Carbon Dioxide Emissions Data: Table 2. State energy-related carbon dioxide emissions by year, adjusted \(1990-2017\)](#).” Environment.
- U.S. Energy Information Administration. 2020. “[Total Energy Consumption Estimates by End-Use Sector, 1960-2018](#).” State Energy Data System.
- ⁹⁹ U.S. Energy Information Administration. 2020. “[State Carbon Dioxide Emissions Data: Table 2. State energy-related carbon dioxide emissions by year, adjusted \(1990-2017\)](#).” Environment.